INDIA RUBBER WORLD

JUNE, 1942

Newsletter No. 6 *PUBLISHED BY RUBBER CHEMICALS DIVISION OF* DUPONT *JUNE 1942*

Neoprene Latex is Adaptable to Principal Rubber Latex Manufacturing Processes

NEOPRENE latex has been used for years in the manufacture of various products requiring the valuable characteristics of neoprene. Additional production experience with neoprene latex should be gained now against the time when the present stocks of rubber latex have been depleted. Over ten years of experience in the field and research in the laboratory has resulted in the development of basic information covering all of the accepted processes for the manufacture of products from latex.

NEOPRENE LATEX TYPE 57 is an alkaline aqueous dispersion of neoprene of good mechanical and chemical stability. It contains 50% solids by weight and is slightly "thinner" than rubber latex of similar concentration.

Articles may be made from neoprene latex by dipping, electrodeposition, gelation, or other types of molding.* Fabrics or other fibrous materials may be spread-coated or impregnated with neoprene latex compounds.

COMPOUNDING NEOPRENE LATEX Neoprene latices are supplied only uncompounded and must be compounded prior to use to obtain the desired results. The base formula shown may be varied to meet the requirements of most applications.

NEOPRENE (from TYPE 57 LATEX)	100.00 (dry wt.)
NEOZONE D	2.
Lithopone	10.
Zinc Oxide	5.
Sulfur	2.
TEPIDONE	1.66

VULCANIZATION of neoprene latex may be accomplished in air or steam. Films should first be dried in air at temperatures below 50° C. (122° F.). While films dried at 50° C. have fair tensile strengths, optimum physical properties can only be obtained by curing at temperatures above the boiling point of water. The preferred curing temperature is 140° C. (284° F.).

DIPPED GOODS may be produced from neoprene latex compounds by the conventional processes. While straight dipping in a thickened mix produces satisfactory results, as with rubber latex, one of the patented coagulating dip processes is generally preferred for large-scale production.

PHYSICAL TEST DATA

Air Cure at 284° F. minutes	Modulus at 600% el. p.s.i.	Tensile Strength p.s.i.	Elongation at Break per cent
15	550	3700	900
30	625	3975	880
60	800	4275	870

MOLDING BY GELATION can be readily accomplished with Neoprene Latex Type 57 or Type 60. The addition of 4.0% sodium fluosilicate causes Neoprene Latex Type 57 compounded according to the above basic formula to gel in two to three minutes at room temperatures. Other common gelling agents are also effective.

COATINGS AND IMPREGNATIONS of neoprene are often desired to improve appearance, bind a loose matrix of fibers, or make fabrics oil, chemical and waterproof.

NEOPRENE LATEX TYPE 60 is a special-purpose latex similar to Type 57 except that it contains approximately 60% solids. Neoprene Latex Type 60 is particularly valuable in gelation processes including the manufacture of froth-sponge articles.

THE DUPONT RUBBER LABORATORY, its facilities and broad experience with latex are available to assist in developing essential products from neoprene latex.

Certain processes utilizing rubber latex and or neoprene latex are protected by patents recognized to be valid. Neoprene latex is offered for sale on the condition that it shall not be used in such a manner as to infringe any valid patent.

Typical articles made from neoprene latex: (1) Bulb molded by gelation process; (2) Extruded latex thread; (3) Dipped chemical work glove; (4) Coagulating dip surgeon's glove; (5) Cork gasket dip coated; (6) Corrosion resistant metal coating.

Through the Mill

PRIORITIES—***Preference Rating Certificates or formal priority information must accompany all orders for the following chemicals:***

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Heliozone
Aquarex MDL Paste

In order to avoid unnecessary delay in filling orders, please be sure all orders for these materials are accompanied by the necessary priority information presented in the form prescribed by the War Production Board for the particular rating you are operating under.

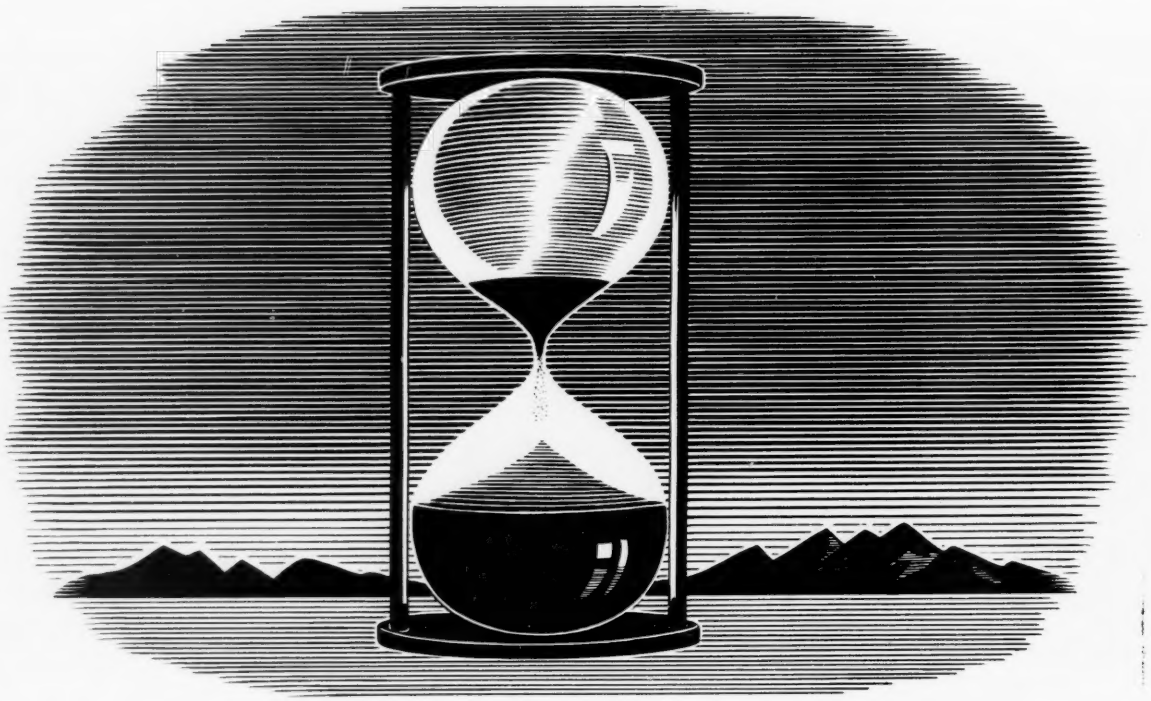
RECLAIMED RUBBER ***stocks that will calendar and extrude smoothly are usually hard to obtain unless they are highly loaded with fillers or softeners. By first plasticizing the reclaimed rubber with RPA No. 3 it is possible to prepare even lightly loaded reclaim stocks that will process satisfactorily. For details on the use of RPA No. 3 for this purpose ask for our report entitled "Plasticization of Reclaimed Rubber with RPA No. 3."***

STIFFENING ***uncured neoprene stocks is sometimes desirable to facilitate handling hose tubes through braiders and looms with a minimum of distortion. Stiffness is also helpful in preventing sagging of open steam-cured, extruded strip and in reducing the percentage of rejects in some complicated molded item. The handling qualities of Neoprene Type GN stocks can often be improved in this respect by substituting a portion of Neoprene Type CG for some of the Type GN in the compound. Data covering the properties of blends of Type CG and Type GN both before and after vulcanization are discussed in a recent report entitled "Neoprene Type GN-CG Blends."***

RUBBER CHEMICALS DIVISION

Wilmington DUPONT *Delaware*

INDIA RUBBER WORLD, June, 1942, Vol. 106, No. 3. Published monthly by BILL BROTHERS PUBLISHING CORP. Printing office, Philadelphia, Pa. Editorial and advertising offices, 386 Fourth Avenue, New York, N. Y., U. S. A. Entered as second-class matter October 5, 1889, at the Post Office at New York, N. Y., under the act of March 3, 1879. Subscription, $3.00 a year domestic; Mexico, $3.50; all others, $4.00; single copies, 35 cents. Application pending transfer of the second-class mailing privilege to the Philadelphia, Pa., Post Office.



TIME AND YOUR PRODUCT

Time marches on. And all who do not march with it are left behind. Position is always relative to those about us. There is no such thing as standing still.

An example . . . the finish on your product. Was it tailored to fit . . . or selected at random from the "ready-to-wear"? Remember that the EXACTLY right finish can cost less and look better. Was it selected ten years ago? . . . or five? . . . or just last year? Remember that even last month's finish may be dated today, so rapid has been advance in finishing technique. Was it engineered to answer all your needs, or only those which were obvious. Remember that foresight pays.

Remember that time marches on . . . that your product must progress with it . . . that progress involves occasional change . . . and that receptivity to change is just another way of saying "open-minded."

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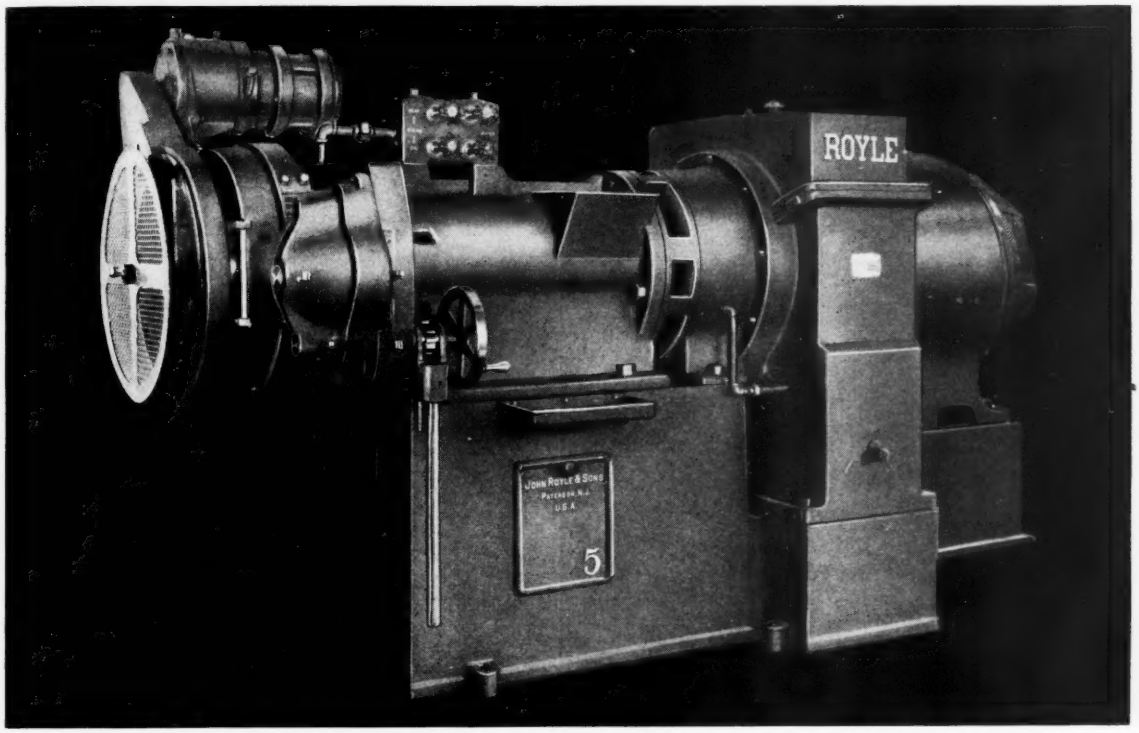

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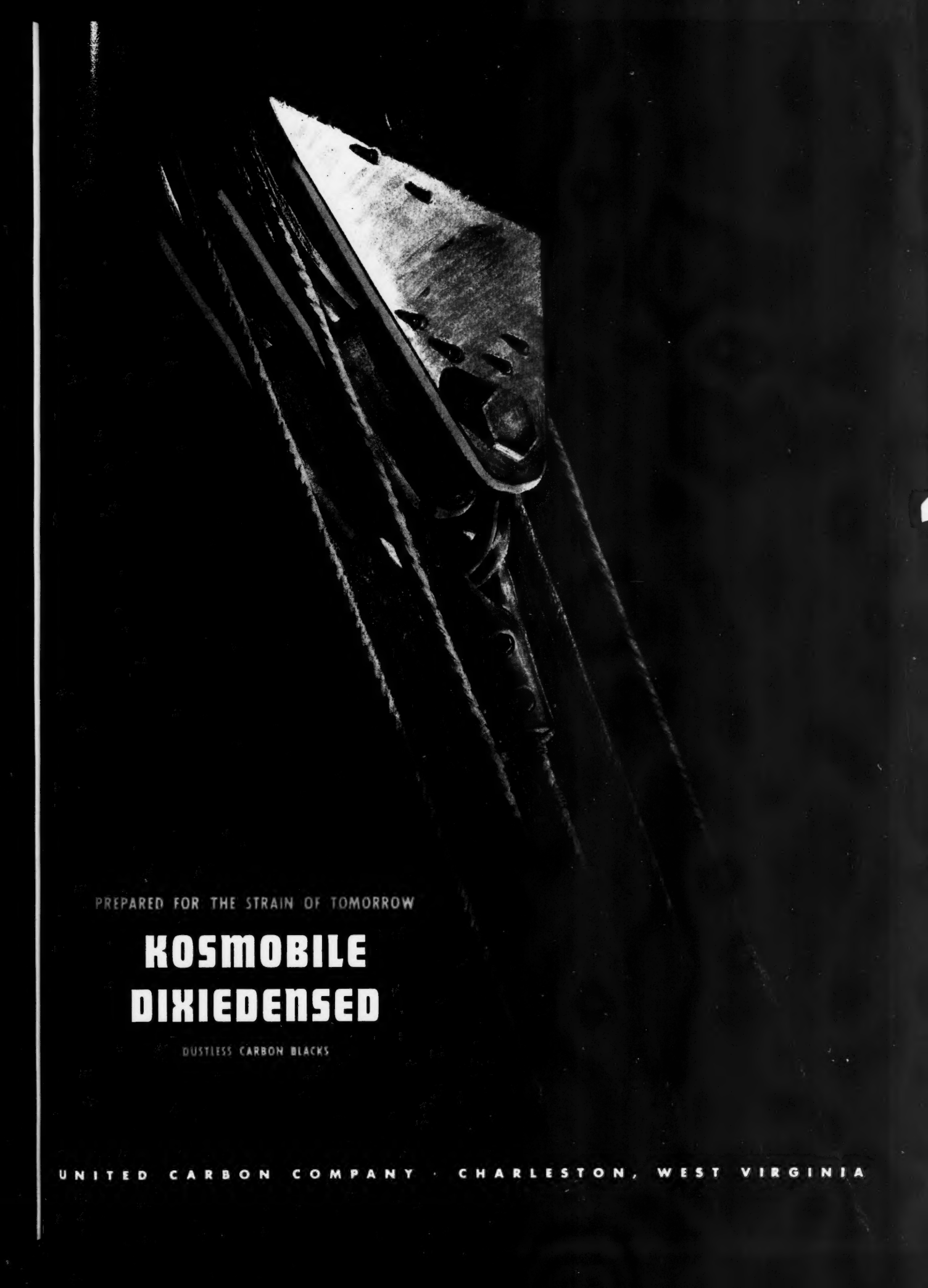
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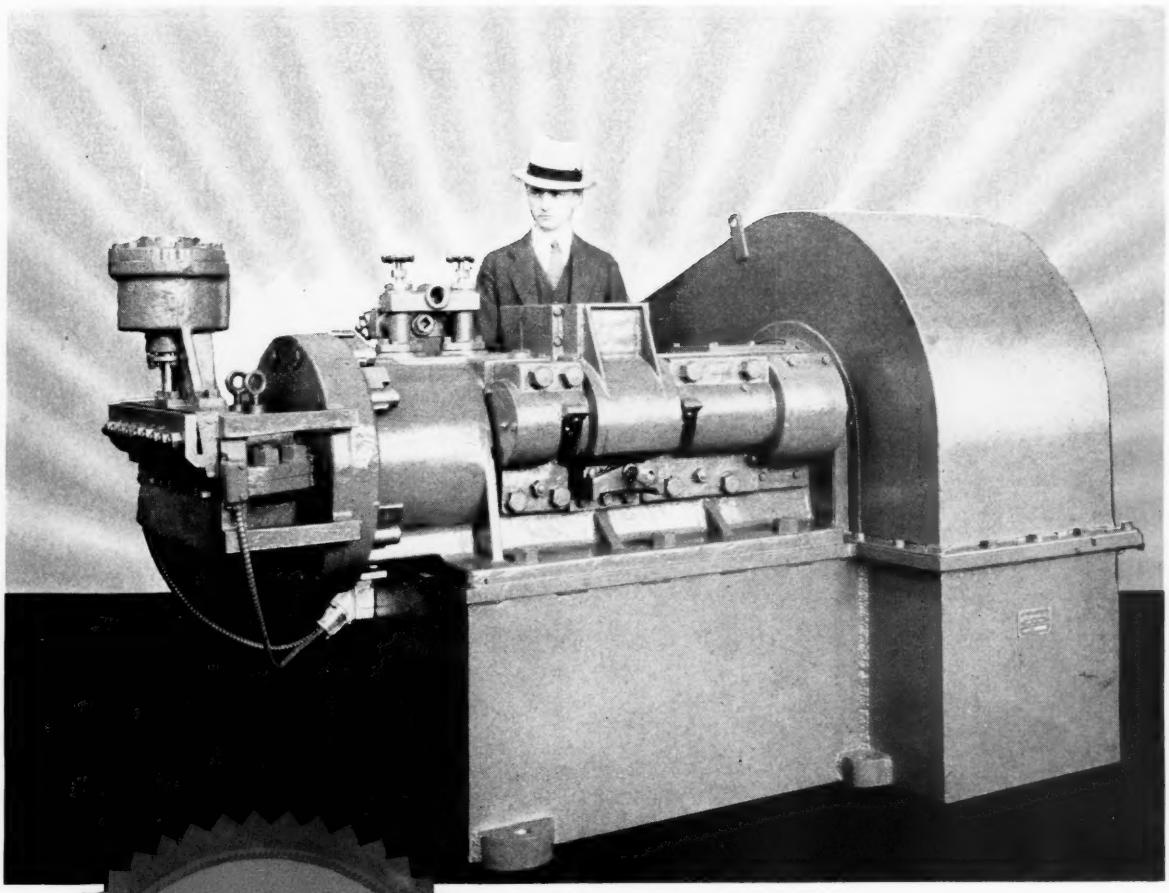
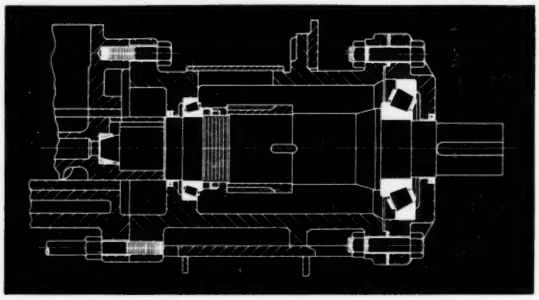


Bring Victory closer while preparing for post-war competition. Redesign your rubber mill machines to increase the use of Timken Bearings.

Section through Farrel-Birmingham 8″ tuber showing the application of Timken Bearings.



This Farrel-Birmingham 8″ Tuber is a good example of the effectiveness of Timken Tapered Roller Bearings in rubber mill equipment.

Timken Bearings are used throughout including the main thrust position. They have a definite influence on volume of output, uniform density of stock, reduced power demand, increased endurance and low maintenance.

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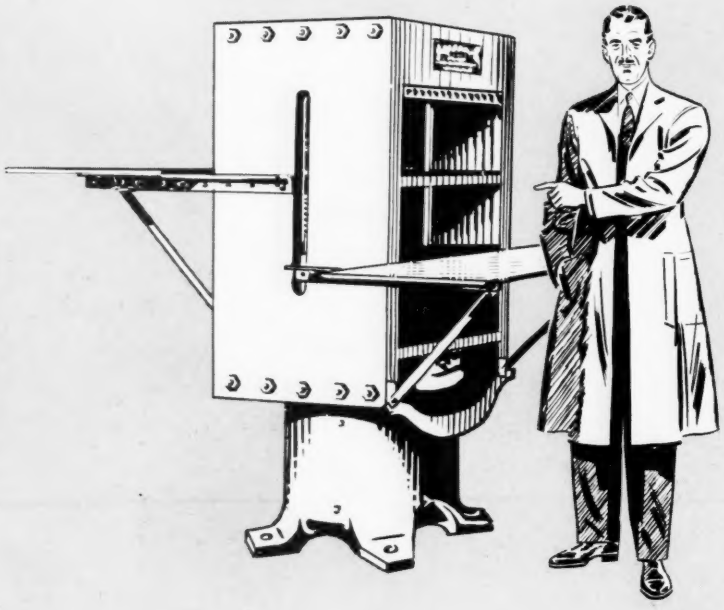

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The press illustrated is but one of many types of Southwark hydraulic steam platen presses engineered to meet today's requirements in rubber and plastics manufacture. When you're planning new plant equipment for the competition of tomorrow it will pay you to specify Southwark.

Southwark hydraulic molding presses have proven their reliability, have shown the way to reduced production costs, have helped many a company do a better job—more economically.

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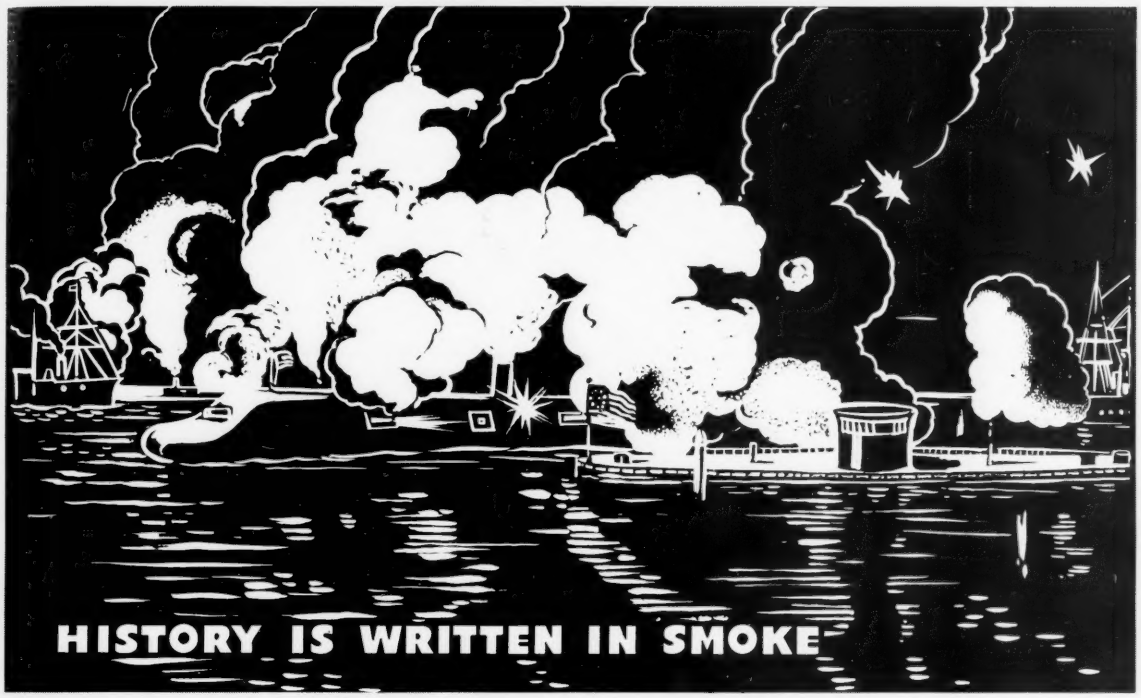

1862 . . . The Monitor, Doom of Wooden Ships

The South's boldest attempt to break its coastal blockade was the foray of the iron-clad "Merrimac" into Hampton Roads. Armored with four-inch iron plates, the "Merrimac" sank one Union sloop and ran two more aground. Next day the "Monitor," a freakish armor-plated "cheese box on a raft," steamed into the Roads to bombard the "Merrimac" until she withdrew. From that day on, wooden fighting ships were obsolete.

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Through nearly 150 years of industrial progress, the makers of ATLANTIC CARBON BLACK have met each new requirement. The Charles Eneu Johnson Company, which in 1804 ground up pigments for paint and printers' ink, now serves some of the greatest names in rubber with precision-manufactured ATLANTIC CARBON BLACKS for every purpose.

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June, 1942

VOLUME 106 NUMBER 3

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INDIA RUBBER WORLD

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INDIA RUBBER WORLD

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Volume 106 **New York, June, 1942** **Number 3**

Hevea Rubber Culture in Latin America[1]

Problems and Procedures—I . . .

R. D. Rands[2]

INCREASED production in the American tropics of Para rubber and many other non-competitive agricultural products needed by the United States is now widely recognized as the keystone in building inter-American economic solidarity. In 1940 the United States paid $318,000,000 for imported crude rubber, but less than 3% of this large sum went to Latin America. Naturally none of it was expended for research or other measures to promote rubber culture in Latin America, although most likely it included the more than a half million dollars of "contributions" and special taxes levied by the Far Eastern exporting countries for these very purposes in those countries.

It has long been the conviction of many agriculturists that not only rubber, but in fact most of the tropical plant products brought from far corners of the world could well be produced in this hemisphere if given the same scientific attention and business management they have received in the Eastern Hemisphere. The spread of war, disruption of trade routes, and final shut-off of supplies have at last crystalized such thought into cooperative intergovernmental programs. These include measures for the immediate emergency as well as for permanent agricultural developments, the latter designed to withstand the post-war economic repercussions.

A résumé of the broad cooperative plan for the establishment of an efficient and permanently self-sustaining rubber-growing industry in Latin America with a review of the progress to April, 1941, has been published by E. W. Brandes, head pathologist in charge of the Special Rubber Project of the Bureau of Plant Industry, United States Department of Agriculture.(1)[3] The undertaking, authorized by the Congress on June 22, 1940, met with immediate and widespread acceptance by all American republics having conditions suitable for *Hevea* rubber culture. Cooperative land surveys and development programs were initiated with the assignment of scientific personnel and contributions of funds or other assistance by the countries concerned. These activities, summarized in the above citation, included the collection and distribution of rubber-tree seeds, the establishment of cooperative propagation nurseries and research centers, the importation and distribution of the most adaptable *Hevea* clones from the East, and proposals for a closely coordinated intergovernmental rubber research program. Thus the organizational plan has progressed to the actual planting of rubber trees in a majority of the dozen or more cooperating countries.

It now seems desirable to discuss some of the procedures and problems that have been encountered and are of interest to most countries. Frank expression of opinion, interchange of ideas, and teamwork will go far toward solving the problems in the shortest possible time. The methods and problems connected with growing rubber in Latin America are somewhat different from those of the East, but they present no insurmountable difficulty. Nevertheless the planting of a new crop of as many years duration as rubber, requires the most careful long-range planning and subsequent attention to avoid expensive mistakes. The land will be occupied for at least 20 years, and such a long period emphasizes the importance of proper initial consideration of such matters as size of the development in relation to costs and to other crops, choice of planting material, methods of land clearing, conservation of soil, planting, intercropping, disease control, and other essential operations. The risks to be assumed in the beginning are of varied nature and magnitude, but in any case are greatly influenced by the type and size of the enterprise.

Type of Enterprise

Many people in this hemisphere have the impression that all rubber in the Far East is produced on plantations operated by European companies with enormous initial capitalization. While it is true that European enterprise started the industry, it was not long before small local firms and individual native farmers took up the culture of rubber. Thus the rubber areas in most of the producing countries range in size from the numerous small, door-yard plantings to the relatively few large estates of many thousands of hectares.

[1] Grateful acknowledgment is made to Karl D. Butler, T. J. Grant, M. H. Langford, and H. G. Sorensen, agents of the United States Department of Agriculture in Latin America, for supplying experimental data on which the clone recommendations in this paper are based.

[2] Senior pathologist, Special Rubber Investigations, Bureau of Plant Industry, U. S. Department of Agriculture.

[3] The numbers in parenthesis refer to "Literature Cited", which will appear at the end of each installment.

Fig. 1. Native Rubber Grower's Hut and Rubber Garden at Rear, West Coast, Sumatra

Over the years it has become evident that the owners of the smaller and medium-size areas of rubber have been less affected than the large plantations by the extreme fluctuation and periodic depression in the price of the product. The former have rarely been dependent upon income from rubber alone, but have relied upon a number of crops which never suffered equally from low prices during periods of depression. Thus in parts of Java it is not uncommon to find the total area of a plantation apportioned among two or more of such crops as rubber, coffee, coconuts, sisal, kapok, tea, and cinchona, depending upon the suitability of the soil, topography, altitude, and other factors. Mixed cultures are likewise common. That of rubber interplanted in many existing coffee gardens will be referred to presently as promising for immediate trial in several of the American republics.

The advantages of crop diversification, catch cropping, and even of mixed cropping under favorable conditions are widely recognized. They are mentioned here only to emphasize the need of better coordination and support of the many meritorious, but isolated investigations of other crops which are important in connection with a successful Latin American rubber industry.

The Small-Farm or One-Family Planting

Although necessarily slow in adopting improved practices, small-farm rubber culture is ideally suited to the basic, well-balanced type of agriculture characterized by individual land ownership and a sufficient diversity of crops along with animal husbandry to insure ample income, stability, and permanence. Such also contributes, of course, to a more balanced national economy. In this case rubber may constitute only a "side line", or accessory source of cash income with little or no capital investment. It is scarcely influenced by availability and cost of labor and, therefore, is particularly suited to colonization projects or small individual land holdings. Polhamus (2) has emphasized the many factors favoring production of rubber by small holders in Latin America.

That the production of rubber from small areas is perfectly feasible is attested by the fact that nearly 50% of recent world production has come from more than a million "native gardens", the individual size of which averages from 0.38-hectare in Java to 2.58 hectares in Malaya. In the Dutch East Indies the native industry has developed with but little governmental assistance and usually in districts removed from European plantations which might otherwise have served as educational centers. A typical small grower's establishment and his product are shown in Figures 1 and 2, respectively. However, the most progressive small-grower industry developed in the Malay Peninsula where it became more or less interspersed with well-managed larger units and has been assisted through educational programs by the government. According to a 1941 report by Vonk (3), the latter were carried out by some 37 Asiatic instructors who were two-year graduates of an agricultural school and were assisted by some 30 demonstrators in teaching the native farmers modern methods of budding, disease control, tapping, and preparing rubber. There were also 14 government demonstration stations and budwood multiplication gardens.

An interspersion of large and small units is preferable for Latin America, as emphasized by Polhamus (2) and Brandes (1). This would assure more rapid general adoption of improved practices such as budding for the propagation of high-yielding clones in contrast with the indiscriminate planting of unselected seedling plants which alone were used in starting the Eastern industry. The success of the banana companies in introducing that crop by stimulating production by individual growers surrounding an initial company plantation suggests the same procedure for rubber. The Goodyear Tire & Rubber Co. has constructed on its Costa Rican plantation, for demonstration purposes, a model one-family type of "factory" for coagulation of latex and preparation of Standard No. 1 quality smoked-sheet rubber. The simple and inexpensive equipment and detailed procedures have been described by W. E. Klippert (4), manager of Goodyear Central American Estates. However in those districts not represented by a corporation-type enterprise the responsibility for the necessary educational and demonstration work will rest with government agricultural agencies. That such responsibilities will be met is illustrated by the program for Brazil, as described by Camargo (5) and Mallery (6), and for Peru as outlined by Sanchez del Aguila (7).

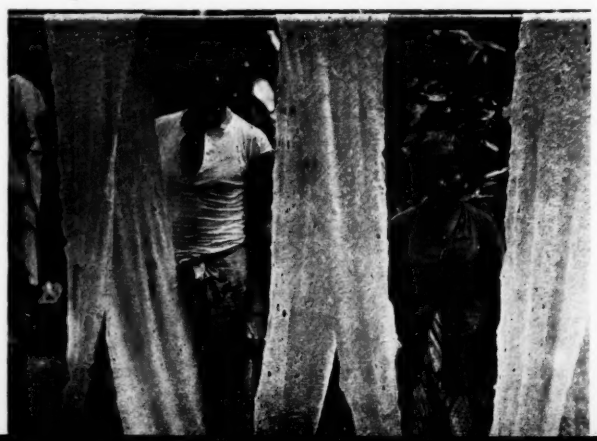
In Haiti stimulation of rubber growing is being undertaken by a local government corporation providing both educational guidance and financial assistance in the form of planting material or crop loans. The Haitian Government program is described by Fennell (8). In all such programs designed primarily for helping the small grower much attention must also be given to other cash crops, as well as to food and sustaining crops, until the rubber at least will provide some income. Catch crops and intercrops are discussed later in this paper.

The Plantation Enterprise

For the medium-sized plantings (50 to 200 hectares) and the large plantations, the amount of capital investment will usually demand sufficiently intelligent management to insure close contact with the experiment stations, extension specialists, or planters' associations. Therefore these growers will not require much outside guidance.

Brandes (1) has emphasized the significant role of

Fig. 2. Crepe Rubber from His Hand-Operated Mangle Drying in the Open



pioneering plantation enterprises in each of the countries as centers for instruction and demonstrations. By selling seed, budwood, and budded stumps, by providing special milling and marketing facilities for the product of surrounding farms, and by conducting field experiments and demonstrations they serve as important links between the experiment stations and smaller growers. The well-organized and successful plantations of the Ford and the Goodyear companies in Brazil and Costa Rica, respectively, have already proved of immeasurable value as demonstration units for the host of official and private observers who desired to see modern methods of plantation rubber production in operation. The public-spirited interest and many years of effort of these companies to promote a Latin American industry, as well as the more recent activity of other American companies not yet possessing plantations in this area, are indicative of the widespread belief in the potential rubber-producing possibilities of Tropical America.

Commercial firms and individual business men have frequently inquired as to what should be the optimum size of a plantation enterprise in order to afford competent and independent management that will handle all operations from the importation of supplies to the preparation and export of the rubber. This question cannot be answered, of course, by naming any particular figures; it depends upon a whole array of varying circumstances which need not be elaborated here. Perhaps some actual figures on the range in size of areas operated by Eastern rubber companies will suffice for the present. The Report of the Rubber Growers' Association of London for 1940 summarizes the data on British companies as follows:

ACREAGES OWNED BY BRITISH COMPANIES IN MAJOR PRODUCING AREAS

Country	Number of Companies	Acreage in Rubber	Acreage per Company
Malaya	357	1,344,615	3,766
Sumatra	49	297,500	6,071
Java	50	187,823	3,756
Ceylon	95	159,997	1,684

This table shows the surprisingly small *average* total rubber area operated by individual companies. Furthermore a company's ownings are often divided among several widely scattered small "estates", as in Ceylon, for example, where, according to Gehlsen (9), there are 876 estates with an average size of only 399 acres (162 hectares). Few, if any, of the smaller companies are independent in the sense of being self-contained operating units although they may be independently capitalized and directed. They depend upon a somewhat complicated estate agency system for their banking, brokerage, labor recruiting, and even general estate supervision through "visiting agents" in order to reduce administrative expense. Figure 3 shows the headquarters of a representative Java estate.

The obvious advantages of such a method for general business management will appeal to all small, locally capitalized rubber companies of Latin America. The present banking and shipping firms in the different ports could well install an estate or "hacienda department", with an experienced rubber administrator in charge, and for a small commission look after the general operations of a large number of individual properties. This is, of course, already being done where such firms are the sole or part owner of present coffee or other enterprises.

Planting Material and the Problem of Leaf Blight

The most serious problem in the culture of the Para rubber tree (*Hevea brasiliensis*) in Latin America is the presence of the South American leaf blight caused by the fungus *Dothidella ulei*. This disease occurs throughout the native range of the genus *Hevea* in the Amazon Valley including, besides Brazil, parts of Bolivia, Peru, Ecuador, Colombia, the Guianas, and Venezuela. In early years it spread into plantings on the island of Trinidad and during the past decade has appeared in Panama and Costa Rica. Although during the cooperative rubber surveys of 1940 leaf blight was not found in Nicaragua, Honduras, El Salvador, Guatemala, Mexico, and the island of Hispaniola, it remains an impending hazard in these countries to all present and future rubber plantings not consisting of resistant strains of the tree.

Fig. 3. Government Rubber Estate, "Boewaran", Middle Java; Factory (in Foreground), Office, Warehouse for Drying and Storage of Crepe Rubber, and Plantings of Mature Rubber in Rear

Leaf blight was responsible for the complete failure in 1912-1915 of the otherwise very promising rubber plantations of the British and Dutch Guianas and Trinidad. It spread from the scattered wild trees of *Hevea guyanensis* and *H. confusa* (now considered a variety of *H. pauciflora*) in the Guiana jungles to the pure stands of the *H. brasiliensis* on the nearby plantations. Repeated defoliations exhausted the trees in their attempt to maintain a leaf crown with resulting die-back of branches and failure to yield appreciable latex. Seeds to establish these plantings had been imported from Far Eastern estates which recently, judging by the behavior of further seed importations, have again demonstrated their predominant susceptibility. Stahel (10) made an intensive investigation of the disease in Dutch Guiana, but failed to discover any practicable method of field control.

Early Evidence of Resistance

In British Guiana, between 1917 and 1921, several investigators (11, 12) reported observation of occasional trees which, judging by their outstanding growth and practical freedom from infection, were apparently resistant to the leaf disease. The observations of these men were repeatedly confirmed in 1923 by the present writer during a survey of abandoned Guiana plantations (13). At that time a considerable number of trees were found with healthy foliage, but closer examination often revealed evidence of earlier die-back so that the actual number in a given planting without such evidence, and thus apparently resistant, was exceedingly small. Nevertheless the feasibility of controlling the disease by selection and propagation by bud-grafting only resistant trees was obvious

and well-documented at the time, but lack of national interest in a western source of rubber discouraged any continuation of the project.

Development of Resistant Clones

The Western Hemisphere is indebted to two pioneering companies for the initial demonstrations that rubber plantings can be successfully established in spite of the leaf blight. The first of these was the Ford Motor Co. which, in 1927, started plantations along the Tapajos River in Brazil; and the other, the Goodyear Tire & Rubber Co. with its experimental plantations begun in 1935 in Panama and in 1936 in Costa Rica. Both companies started plantations in infested districts without benefit of preceding research and development of resistant clones, as proposed above. This they realized so that initial plantings were confined to experimental size and progress warranting commercial expansion was necessarily slow. After the first discouraging years with leaf blight, no private concern with limited means would have continued these projects. They were popularly regarded as failures. By that time, however, the respective managements had already discovered, selected and propagated the occasional seedlings and selected strains of the tree that showed resistance to the scourge.

Ford had started the Fordlandia Estate by planting seeds collected from wild trees in the region about the plantation; later collections were obtained from several parts of the Amazon Valley, and still later many high-yielding Eastern clones were introduced. Some Eastern clones may prove sufficiently resistant for inclusion in mixed plantings on the more favorably situated Belterra Estate. Local clones have been established from many highly resistant and superior yielding seedling trees discovered after tapping the first plantings which originated from the various Amazonian seed collections. The severity of leaf blight on all susceptible plants, especially at Fordlandia, and the comparative freedom from disease of the more outstanding selections demonstrated the resistance of the latter. A. Johnston, general manager, has supplied information for the most recent account (14) of these plantations.

Goodyear first tried out many hundreds of high-yielding Eastern clones introduced as budded stumps from their Philippine plantation. Less than 1% of these proved sufficiently resistant to be considered safe for commercial planting even on the most favorable sites. At the same time resistant selections were made in the local grove of mature seedling trees on its Costa Rican tract, and systematic disease testing of clonal seedlings derived from Philippine seed importations was begun. Large shipments of these naturally cross-pollinated clonal seeds were planted yearly. Through the repeated epidemics of leaf blight affecting these nurseries a total of several hundred seedlings emerged with varying degrees of resistance, but always recognized by their outstanding growth in contrast with the dwarfed and defoliated seedlings surrounding them. The best of these selections have been multiplied as clones and included in a mixture for expansion of commercial plantings with anticipation of securing "normal" (about 1120 kilograms of dry rubber per hectare per year) or superior clonal yields. The history and present status of the Goodyear Central American estates have been sketched in recent articles by W. E. Klippert (15), local manager, and J. J. Blandin (16), vice president of the Goodyear Rubber Plantation Co.

Intergovernmental Selection and Breeding Project

The foregoing briefly summarizes the significant progress toward founding a permanent *Hevea* rubber culture in Latin America and the situation up to June, 1940, when the United States Congress provided funds for the present widespread cooperative program. This new project embraces not only research for improvement of present planting materials, but immediate practical arrangements for stimulation of commercial planting of existing resistant clones in all interested countries. Cooperation of the above-mentioned pioneer rubber-producing companies was immediately forthcoming, and active assistance was proffered by the larger banana-growing companies interested in finding substitute crops for the immense areas of land which had been abandoned because of the wilt and "*sigatoka*" diseases attacking the banana crop.

Research headquarters of the United States Department of Agriculture for the study of leaf blight and the testing and selection of new clones have been located at Turrialba, Costa Rica, and at Belém (Para), Brazil, in cooperation with the respective governments.

U. S. D. A. Cooperative Rubber Plant Field Station, Turrialba, Costa Rica. This station is now fully equipped and staffed and possesses ample surrounding land for nurseries, clone collections, and other limited plantings. Turrialba was selected as an ideal place for investigations of leaf blight, which occurs there, and for determining the resistance or susceptibility of all *Hevea* collections. Its elevation of about 560 meters in a valley subject to prolonged morning fogs for at least part of the year, its low night temperatures, and late-disappearing dews all favor the spread and severity of the leaf-blight fungus without the aid of much artificial inoculation. This combination provides a most severe test of resistance.

Both soil and climate are also representative of immense well-populated and healthful districts of Central America at intermediate altitudes where rubber of fully resistant type may be grown. At these elevations of 300 to 700 meters the trees probably will require a year longer to attain tapping size, i.e., when about 75% of the trees have attained a girth of 50 centimeters at one meter above the ground. Thereafter yields should equal low elevation rubber according to comparisons available from Java.

Los Diamantes Experiment Farm, Guapiles, Costa Rica. For the lower elevation experiments the Government of Costa Rica has provided the 1,000-hectare Los Diamantes Farm near the town of Guapiles, some 72 kilometers from Turrialba, now reached by rail, but eventually to be connected by highway. This farm is about 250 meters above sea level and is representative of the broad northern coastal plain which is highly suitable for *Hevea*. Plantings consist of budwood multiplication gardens, annual planting of row tests with clones established from resistant selections in the Turrialba nurseries, replicated plot tests with the best clones, clonal crossing gardens, and seed gardens. Propagation gardens to supply budwood for distribution to growers in all blight-infested areas are located here.

It is also in this coastal area near the town of Siquirres that the Speedway Estate of the Goodyear Rubber Plantations Co. is located. The cooperative investigational program with this company, dating from 1937, now aims chiefly at discovering superior new clones from seed collections furnished by this Department. A large commercial acreage of resistant Brazilian seedlings has been planted for this purpose. Propagating material of those selections which best combine resistance with superior yield will later be returned to Brazil and supplied other official agencies participating in the cooperative program.

U. S. D. A. Cooperative Field Laboratory, Belem, Brazil. This is the official designation of excellent facilities provided the United States workers by the Instituto

Agronomico do Norte at Belem, which is a part of the Brazilian National Department of Agriculture. Principal investigational projects conducted cooperatively with the Instituto's staff of specialists comprise, (a) botanical and pathological studies of the wild *Heveas* in major districts of the Amazon and its tributaries in Brazil; (b) collection of budwood and seeds from superior "*estrada*" trees in connection with the above studies; (c) annual planting of nurseries with the collected seed at Belem and associated up-river field stations for comparison of regional types, varieties, and species in resistance to diseases and pests; (d) resistance tests and selection of improved clones from special clonal seed progenies furnished by this Department; and (e) improvement of methods of tapping and preparation of rubber from wild trees.

Progress has been made on all of these cooperative projects, especially (d), under which this Department has imported from the Philippines and Liberia more than a million hybrid clonal seeds for testing. Later such seed for the isolation of superior new clones will come from breeding stations in the Latin American countries that are free from leaf blight and where the susceptible but best breeding clones from the Far East may be employed. Their superior yield, however, can be combined with the resistance of the Amazonian selections through appropriate crosses. Therefore the best clones of the future will not be direct selections from the above-mentioned (b) wild collections, but will derive from second- and later-generation segregates from intercrossings between the best clones from both sources.

The pioneer Ford plantations on the Tapajos River have already demonstrated the commercial feasibility of selecting resistant strains for establishment of plantings in the Amazon Valley, as outlined in a foregoing section of this paper. To the corps of investigators now at the Instituto such an example provides a powerful stimulus and abiding faith in the nearly unlimited possibilities of this immense region. Resistant strains of *Hevea* represent the only practicable solution of the leaf blight problem, and this the Ford company has achieved with excellent chances of having the resistance combined with superior yield in many of their clones. Their best selections have been made available for general distribution not only in Brazil, but to this Department for the widespread intergovernmental cooperative program. These Ford clones at present furnish an important component of a satisfactory clone mixture for rubber planting generally.

Important contributions of superior clones are expected from other countries of the Amazon region, especially Peru and Bolivia, which reputedly also possess good types of wild trees as a basis for selection. Cooperative projects with Peru are located at Iquitos, Oromina, and Tingo Maria rubber stations.

U. S. D. A. Cooperative Rubber Plant Field Station, Marfranc, Haiti. This station was established on land and with facilities provided by the Republic of Haiti. Its immediate purpose is the propagation of planting material for distribution locally and to the countries southward. Ultimately it will serve as a principal breeding station at which many of the leaf-blight susceptible, but excellent breeding clones of the East may be crossed with the best and most highly resistant selections from wild trees obtained through the cooperative studies with Brazil, Peru, Ecuador, Colombia, and other countries that are included in the Amazon and Orinoco River systems.

From present knowledge Haiti appears to have less chance of becoming invaded with leaf blight than any of the other blight-free continental areas. When one realizes the millions of plantation trees from which the Eastern clones were laboriously selected, the advantages to be gained from combining this concentration of yielding and other qualities with the resistance of the Amazonian selections are obvious. Naturally, also, intercrossings among the local clones to increase both yield and resistance (if needed) will be carried on, and such will be more successful in the absence of blight to damage the tender flowers.

U. S. D. A. Cooperative Rubber Plant Field Station, Tela, Honduras. This station utilizes the land, buildings, and other facilities of the Lancetilla Farm, which was the earlier research headquarters of the United Fruit Co. in Honduras. It is operated under cooperative agreements with this company and with the Ministry of Agriculture of Honduras. The limited area of available land is devoted exclusively to budwood multiplication and clonal gardens. Two groves of mature seedling rubber trees planted in 1926-27 by the United Fruit Co. yield some 300,000 seeds annually which are used for production of root stocks. The trees are tapped regularly, and the latex is used in demonstrations of sheet rubber preparation on a small-scale or a typical and feasible one-family size of enterprise.

This station is a convenient headquarters for personnel assisting periodically on cooperative projects with the Ministries of Agriculture of Honduras, Guatemala, and Mexico. The range of soils and climates in these republics necessitates well-distributed experimental plantings and other cooperative investigations. Freedom from leaf blight will permit a whole chain of strategically located breeding and seed gardens where the highly susceptible, but best breeding clones of the East may cross-pollinate with resistant materials. In Guatemala large cooperative field tests are planned with owners of several coffee fincas interested in converting low-land coffee areas into rubber or in achieving a permanent mixed planting of the two crops.

In Mexico cooperative projects are under way with the Ministry of Agriculture at the El Palmar Experiment Farm near the town of Tezonapa, State of Vera Cruz. Some 300 acres of mature seedling rubber trees near this station provide ample seed for production of root stocks and are under investigation for superior clones. Some of the latter, following blight-resistance tests at the Turrialba, Costa Rica, station, may prove valuable for commercial planting.

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(*To be continued*)

Chemical Reactions of Rubber—I[1]

R. L. Sibley [2]

OWING to the newspaper reports and publicity centering on the rubber situation for the past five months, the American public has become very rubber conscious. Its entire concern, however, has been largely due to the effect on individuals of the non-availability of rubber for tires and scores of other rubber products that are important and necessary to our present-day scale of living. Crude rubber always has been considered mainly from the viewpoint of serving as the raw material for the rubber manufacturing industry. And this great industry, so marvelously expanded and developed during the past 30 years, is based almost exclusively upon a single chemical property of rubber: namely, the capacity of rubber to combine with sulphur and to a minor degree with sulphur compounds, such as sulphur chloride.

Yet there are other equally characteristic, but less well-known reactions of rubber that have been described, some of which, on further study and investigation, conceivably might develop into other important industrial products. A start already has been made in the commercial application of certain of these other derivatives of rubber. Most of the literature descriptive of the various known derivatives of rubber is found published as patents rather than as technical papers, thus indicating the commercial possibilities that may be expected from these developments. Fisher (1)[3], and Schidrowitz (2), and more recently Jones (3) have previously summarized and discussed the chemistry of rubber and its commercial derivatives.

The decomposition of rubber by heat has been studied by several investigators. Williams (4) showed that isoprene was one of the main products formed by the destructive distillation of either caoutchouc or gutta percha. Later investigators have shown that slow heating in vacuo at 300° C. converts somewhat more than one-half of the rubber hydrocarbon into a solid, thermoplastic, isomeric product, which has a high molecular weight and less unsaturation than that of the original hydrocarbon (5). Rapid heating, especially in vacuo, converts almost all the rubber into volatile products. The most complete investigation of the products obtained by the heat decomposition of rubber apparently was carried out by Midgley and Henne (6). These investigators destructively distilled 200 pounds of pale crepe rubber in 16-pound batches by raising the temperature as rapidly as possible to 700° C. at atmospheric pressure in an iron kettle. The condensate was fractionally distilled, and cuts were made every degree between 50 to 176°. Each cut was then separately examined. Twenty-three different hydrocarbons were identified in the distillate.

On the other hand, rubber mixed with 10% by weight of aluminum chloride, and decomposed by heat, produces no isoprene and yields products entirely different from those formed by destructive distillation. From 200 grams of rubber so treated, there were produced 14 liters of gaseous products and 140 grams of liquid products (7). In a later paper, by heating rubber for from 1½ to 2 hours at 400° C. and under a pressure of 150 atmospheres of hydrogen in the presence of molybdenum sulphide or nickel deposited on aluminum oxide, only a mobile liquid product results which consists of saturated and unsaturated hydrocarbons (8).

A number of products have been obtained by the oxidation of latex or of dry rubber, some of which are available on the market. A sticky latex, claimed to have certain advantages as an adhesive over ordinary latex, has been prepared by oxidation with hydrogen peroxide (9). By the oxidation of rubber with peracetic acid (10) products are obtained which are claimed to be adaptable for use in films, lacquers, and moldings, but thus far none of these has apparently been produced from such a material.

When rubber is treated with oxygen in the presence of certain catalysts, such as cobalt linoleate and other paint driers, disaggregation and oxidation take place, and a series of products are obtained varying in oxygen content from a small fraction of a molecule of oxygen up to 0.5-molecule for each C_5H_8 unit. The product can be made by milling the catalyst into rubber or by aerating at 80° C. a rubber solution containing the catalyst (11). Depending on the degree of oxidation, the products formed vary from alcohol or acetone soluble to insoluble products. The soluble products are used in paints and varnishes; and since the product is thermosetting, it is used for the impregnation of insulating coils which are finished by baking.

An oxidized rubber product is obtained (12) by treating unmasticated rubber in a solvent with oxygen or with a substance liberating oxygen such as hydrogen peroxide and perborates in the presence of a metallic oxidizing catalyst.

According to United States patent No. 2,030,191 (13) a solution of acetyl peroxide in benzene is mixed with a benzene solution of rubber, and after the mixture has stood for 24 hours it is steam distilled, dried, and ether extracted. A hard yellow thermoplastic is obtained which can be plasticized with the aryl phosphates and alkyl phthalates.

Although no commercial developments followed from the work, the general structure of the rubber hydrocarbon, together with the position of the double bond in a unit group, was determined almost entirely by ozonolysis through the studies of Harries. Ozone adds to an olefin at the double bond forming an ozonide which, on hydrolysis, is decomposed into an aldehyde or ketone, according to the groups attached to the double-bonded carbons. By this general procedure Harries found that the decomposition products consist of levulinic aldehyde, levulinic acid, and levulinic acid peroxide, with smaller proportions of formic acid and of succinic acid (14).

Rubber is an unsaturated hydrocarbon, and in view of this is a substance capable of hydrogenation. Pummerer and Burkard (15) obtained a partially hydrogenated product by reducing a solution of purified rubber in hexane and in methyl cyclohexane, using platinum black as a catalyst. The product was elastic and similar to rubber in many respects, but was colorless. Working under different conditions, Staudinger and Fritschi (16) hydrogenated rubber completely at 270° C. and under 100 atmospheres' pressure. This product was also colorless, but did not possess any elastic properties. Although several patents have been granted claiming the use of hydro

[1] Paper presented before the Chicago Group, Division of Rubber Chemistry, A. C. S., May 1, 1942.
[2] Monsanto Chemical Co., Rubber Service Dept., Nitro, W. Va.
[3] For literature references see end of article.

rubber for various objects, it is not known that any of these have actually been employed. A white amorphous product is obtained by the hydrogenation of rubber (17). Hydrogenation may be carried out in the presence of hydrocarbons (18). Such products may be used to increase the viscosity of lubricating oil (19).

The reaction of the halogens with rubber has been studied for a longer time and by many more investigators than have the other non-sulphur derivatives of rubber. Although the first work was reported in 1801 by Roxburgh, it is not apparent that he obtained a chlorinated rubber, since he employed carbon bisulphide as a solvent, which itself is readily chlorinated. Engelhard and Day (20) exposed lumps of rubber to the action of chlorine and preferably passed a stream of chlorine through a solution of rubber in chloroform or benzol (21). Products ranging from a flexible material to a hard leather-like mass were obtained. Although several other patents were granted on methods of producing chlorinated rubber, the nature of the reaction was not studied for some time. Gladstone and Hibbert (22) extensively investigated this reaction and found that chlorine reacted with rubber by addition and also by substitution. By the analysis reported for the product formed, it appears that there were six chlorine atoms added and two chlorine atoms substituted in the parent $C_{10}H_{16}$ group, with the final product having the formula $C_{10}H_{14}Cl_8$. It is questionable if the analysis was correct since later work has shown the heptachloride, $(C_{10}H_{13}Cl_7)x$ to be the product formed.

The first commercial development of a chlorinated rubber product evidently is due to Peachey in England (23). According to these patents, rubber heptachloride, $C_{10}H_{13}Cl_7$, is produced by passing chlorine in excess into a chloroform or carbon tetrachloride solution of rubber. Lesser quantities of chlorine yield a more flexible and softer product. This material was marketed under the name of "Duroprene" and was suggested for use in a varnish for acidproofing and waterproofing paper, leather, and fabrics.

Later, chlorinated rubber attracted more attention, and several investigators, particularly the Germans, developed methods of producing chlorinated rubbers forming solutions lower in viscosity, thereby increasing the field of application. It was found that the nature of the product depended on the temperature of chlorination, the nature of the solvent employed, and the degree to which the rubber was broken down (24). Chlorinated rubbers vary in regard to their resistance to heat, viscosity of solutions, and film-forming capacity. The commercial products are quite non-inflammable and are resistant to petroleum solvents and to oxidizing acids, but are soluble in coal-tar solvents. The main application of the product appears to be as corrosion-resisting paints and lacquers. Solid chlorinated rubber products having a cellular structure are described by Montgomery (25) as obtained by heating in a mold an aqueous emulsion or dispersion of a solution of chlorinated rubber in a volatile solvent. An expanded fibrous product is obtained by Schidrowitz and Redfarn (26) by heating solid chlorinated rubber under pressure and releasing the pressure while maintaining the temperature. The product has a specific gravity of but 0.087 and possesses a cellular structure.

The hypochlorite of rubber is obtained (27) by shaking a benzene rubber solution with ethyl hypochlorite and removing the solvent. The dried product is stated to be solvent resistant.

A yellow resin results from reacting under reflux with phenyl sulphur chloride, a benzene solution of rubber (28).

Other halogen derivatives of rubber have been produced, but apparently have not been developed commercially, probably because of their cost. Rubber is converted into soft tacky or hard brittle thermoplastic products by treating a carbon tetrachloride solution of rubber with boron trifluoride in acetic acid (29). Rubber hydrofluoride as a leather-like or horn-like product is obtained by reacting rubber in a solvent with hydrofluoric acid (30). A similar product, usable as a lacquer or an adhesive, results from milling aqueous hydrofluoric acid into rubber and heating the mix in an autoclave for 16 hours at 100° C. (31). A product resembling gutta percha, which can be obtained as a hard porous material, results from mixing rubber with up to 10% by weight of phenyl diazonium fluoborate and heating for two hours in an oven at 130-140° C. (32).

A rubber fluoride, $C_5H_6F_2$, containing up to 30% fluorine is made (33) by treating rubber in carbon tetrachloride solution with fluorine mixed with 10-50% by volume of an inert gas, such as nitrogen, air, or carbon dioxide.

A solution of rubber, containing a dehydrating agent is treated with a fluorine compound such as boron or phosphorous halides. The products vary in properties, depending on the length of treatment. The products are thermoplastic, but brittle (34). Variations in the production of rubber fluorides, or products resulting from the action of fluorine compounds on rubber are described in three patents (35).

An interesting development is covered by British patent No. 523,734 to Dunlop. By treating a solution of rubber in carbon tetrachloride, containing paraformaldehyde with gaseous boron trifluoride, a gel is obtained. After removal of the solvent, a hard white rubber derivative remains that can be sheeted out on a mill only with difficulty. By treating vulcanized rubber similarly, a surface coating is formed that is said to make the rubber more resistant to surface abrasion and less easily deformable.

Bromine acts in a manner similar to chlorine and reacts by substitution as well as by addition. The tetrabromide $C_{10}H_{16}Br_4$ is a white amorphous solid, soluble in very few solvents (36).

Iodine forms various unstable products with rubber of no definite composition and sometimes containing oxygen in addition to iodine (37). A later investigator (38) reported that a white powder soluble only in chloroform and alcohol, but decomposed by heat was obtained by exposing to sunlight a mixture of a 1% solution of rubber in chloroform with iodine. Neither the iodide nor bromide of rubber has apparently been put to industrial use.

Rubber dibromide reacts with triphenyl phosphine and triethyl phosphine as they do with ordinary alkyl halides (39). The reaction is not complete, and the products behave like saturated compounds which are insoluble in benzol and chloroform. The solid forms are elastic. Rubber tetrabromide and molten phenol, in the presence of aluminum chloride and preferably ferric chloride, evolve hydrobromic acid and form a product tetroxy-phenylpolyprene, $C_{10}H_{16}(O.C_6H_4)_4$ (40). The products possess a high molecular weight, are colored, and are toluene soluble.

A class of rubber derivatives or reaction products varying in physical characteristics from soft rubbery types through the gutta percha and balata types to hard, shellac-like types, all consist of a hydrocarbon with the formula $(C_5H_8)x$ and have less unsaturation than rubber itself. The unsaturation varies from about 57% of that of rubber to about 20%. Since the change in unsaturation is thought to be due to internal cyclic arrangement, the products are known as cyclic rubbers. The products have been described by Staudinger (41) as monocyclo rubbers and polycyclo rubbers, depending on whether the unsaturation was half or less than half that of rubber.

Monocyclo rubber is a white, non-elastic powder that sinters at 120° C. and melts at about 130° C. It is soluble in benzene and petroleum ether and insoluble in alcohol and ethyl ether. Polycyclo rubbers are asbestos-like masses lacking all elastic properties. They are soluble in benzene, chloroform, and carbon bisulphide and insoluble in alcohol and acetone. The physical properties vary with the conditions of preparation.

These cyclo rubbers are produced usually by the action of acids combined with heat on rubber. In 1910, Harries showed that an amorphous powder, insoluble in the usual rubber solvents and more saturated than rubber, resulted from the action of sulphuric acid on Para rubber at ordinary temperatures. The development of the products of this class of commercial importance was due to Kirchhof (42) and Fisher (43). There are a number of patents in several countries patenting the manufacture and application of such cyclo rubbers.

In Fisher's work sulphuric acid was first employed as the cyclicizing agent (44) followed by a study of p-toluene sulphonyl chloride and various sulphonic acids (45). The method followed is to mill the reagent into rubber on the ordinary mixing mill and heat the resulting mix. It was found that, according to the activity and quantity of the particular cyclicizing agent, the concentration, and temperature employed, the properties of the product obtained could be varied widely. Mild cyclicization produces products which resemble gutta percha and balata, while more vigorous treatment produces substances of a hard, balata-like nature and finally shellac-like materials. These various products have been given the name of "thermoprenes" (signifying a thermoplastic unsaturated hydrocarbon derived from polyprene) with letters GP (resembling gutta percha), HB (like hard balata) and SL (meaning shellac-like). The thermoprenes vulcanize on heating with sulphur and will combine with up to 21% sulphur. They dissolve with difficulty in rubber solvents. They react with the halogens, halogen acids, and oxygen. The most important property of the thermoprenes is that of producing adhesion of vulcanized rubber to metals, wood, and like surfaces. This process is widely used for the lining of tank cars, storage tanks, and the like with chemical-resistant rubber and produces an effective and firm union for use at ordinary temperatures. The adhesive joint softens at about 60° C.

Various other thermoplastic derivatives of rubber have been described, mainly in the patent literature, which differ in the cyclicizing agent employed. Thus a product more heat plastic than caoutchouc and of lower unsaturation is obtained by mixing anhydrous salts such as the iodides of aluminum, antimony, iron, and other amphoteric metals with rubber and heating at 200 to 250° C. (46). A thermoplastic product results from treating rubber with a mixture of a halide salt and a soluble salt containing water of crystallization. In an example, rubber is milled with alum and phosphorus pentachloride followed by heating from 5-15 hours at 160° C. (47). Fisher also has shown (48) the production of cyclo rubbers by the milling together into rubber, and heating of a phenolic substance, such as phenol, pyrocatechol, naphthol, with an acid or a compound capable of producing an acid on heat decomposition.

Several procedural variations have been described for the phenolic-rubber products. According to one method (49) rubber is treated on a mill with 10% its weight of β-naphthol and 4% its weight of sulphuric acid. After the reaction is over, as indicated by a drop in temperature, approximately 2% its weight of para formaldehyde is added, and the milling continued. At the end of 30 minutes' total milling, the batch is sheeted off the mill as a dark-brown thermoplastic softening at 90° C. This product is called "Isolac" (50). A somewhat similar product is made by heating rubber with a phenol in the presence of an acid at 170-180° C. The feature of this patent (51) is the use of an acid, such as hydrochloric acid, which does not combine with the phenol. In another process (52) the reactants are all brought together simultaneously in the presence of a solvent. The product, a white powder, is said to be capable of being molded at 140-160° C.

Sebrell and his co-workers, Bruson and Calvert, (53) have obtained thermoplastic products by reacting a benzene solution of purified rubber with various anhydrous metallic halides such as stannic chloride, and ferric chloride, to form molecular addition compounds which, on treatment with alcohol, liberate metallic chlorides and form cyclo-caoutchouc.

Acids such as chlor and brom-stannous acids form thermoplastic rubbers when mixtures of the acid and rubber are heated. The products formed vary from a tough product resembling balata to hard, ebonite-like substances (54). The product "Plioform" is a resin which has been described by Thies and Clifford (55). These products, which are thermoplastic and are resistant to many acids and alkalis and to solvents of the acetone type, are marketed as molding powders and also in the form of rods and tubes.

Other types of cyclo rubbers have been patented. According to British patent No. 486,878, leather-like products result from vulcanizing a material obtained by heating with an aldehyde an acidic aqueous dispersion of rubber containing a protective colloid. A chloroform solution of rubber treated for two days at 15° C. with peracetic acid prepared from acetic anhydride and hydrogen peroxide, after being freed from reactants by washing and steaming, forms a plastic product containing 20-23% oxygen (56). Instead of using the preformed per acids, they may be formed in situ. Thus a chloroform solution of rubber is treated with glacial acetic, formic, or chlor acetic acids, and hydrogen peroxide added. After refluxing the mixture for 16-18 hours at 65° C., a yellow resin results (57). A solution of rubber treated with the fraction obtained by distilling a mixture of phosphorous pentachloride or phosphorous oxychloride and phosphoric acid becomes less viscous, is colored reddish brown, and yields a plastic product (58).

Several alternative methods of reacting rubber with phosphorous halides have been described. Thus a chlorbenzene solution of rubber treated with a mixture of phosphorus tri and pentachlorides and heated at 90-95° C. for three to eight hours becomes low in viscosity in a highly concentrated solution (59). A thermoplastic product softening at 100-110° C. is obtained when a benzene solution of rubber is treated with 7-10% by weight of phosphorous oxychloride at 40° C. (60). A tough, hard thermoplastic product is formed by agitating a solution of rubber for two hours, followed by 10 hours' standing, both at room temperature with phosphorous oxychloride, to which was added $\frac{1}{10}$ its weight of water and air blown (61). A modification of this last process involves the use of ultra-violet radiation to accelerate the reaction (62). Other modifications of the action of phosphorous oxy halides on rubber are also described (63).

It seemed of interest to study further the action of phosphorous halides on rubber. In one experiment 100 grams of phosphorous pentachloride were added to 2,000 grams of a 5% benzine solution of rubber and the mixture allowed to stand for 48 hours. The benzene was then removed, and the product washed and dried. There was approximately a 30% weight increase resulting from the reaction. The product was rubbery in nature, but failed

to cure by using conventional methods. The only method found for handling the product consisted in milling in approximately 30% by weight of zinc oxide and curing for 30 minutes at 134° C. The stock cured to a hardness of 70, and the product, while of poor tear resistance, was much more resistant to kerosene than is rubber. The rubber-phosphorous pentachloride product has been found to react further with aromatic hydrocarbons, for example, with a substituted phenanthrene to form a rather soft, tough rubber-like product which compounded with 25% zinc oxide, 40% carbon black, 3% sulphur, 1.25% accelerator, 3% stearic acid, 2% pine tar, and 1.5% antioxidant cured to a hardness of 120 and having 1,135 pounds per square inch tensile strength at 60% elongation. The stock swelled in kerosene only 5%, as compared with 45% for a rubber stock. The stock showed no decrease in tensile strength after aging for 120 hours at 70° C. under 300 pounds' oxygen pressure. The stock showed about the same resistance to ozone as rubber and was worse than rubber in abrasion index and higher than rubber in permanent set. After immersion for eight days in solvents at room temperature, it was much superior to rubber and to certain synthetics in resistance to petroleum and benzol-type hydrocarbons, in chlorinated solvents, in ether and acetone, but was slightly worse than rubber in water. Immersion in solvents for four days at 70° C. resulted in a loss in weight in all solvents tested with the exception of water—extraction was greatest (24%) in the case of gasoline.

Another type of cyclo rubber is obtained when a benzene solution of rubber is treated on the steam bath with trichlor acetic acid (64) or with dimethyl sulphate (65). A carbon bisulphide or benzene rubber cement treated with phthalyl chloride or phosgene and aluminum chloride or with zinc chloride in acetic anhydride, or alcohol, yield tough products insoluble in rubber solvents which are capable of vulcanization (66).

Cyclo rubbers produced by the action of heat alone are capable of hydrogenation. Staudinger (67) saturates such a cyclo rubber with hydrogen under 50-80 atmospheres' pressure in the presence of platinum or nickel as a catalyst, by heating at 270° C. for 20 to 30 hours. Hydro cyclo rubber is a white amorphous solid which is soluble in benzene, chloroform, and ether and is stated to be usable as a substitute for gutta percha. Various methods of producing cyclicized rubber are described by Stevens and Miller (68).

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(To be continued)

Preparing Latex from Guayule

A patent[1] of special interest these days covers an improved process for the extraction and preparation of rubber from guayule and other shrubs, vines, and plants which are not adaptable to customary extraction methods.

The plant is disintegrated in the presence of a buffer solution maintained at the same or slightly higher hydrogen ion cencentration as that of the plant juice. A pH of not less than 7.2 was found satisfactory for guayule as this concentration will neutralize any acidity developed in the juice. The shrub is crushed and milled in such a solution for an hour, which action inhibits coagulation and prevents the formation of "worms." About 90% of the rubber content is recovered in a dispersed milky latex. Impurities such as bagasse, sand, etc., are effectively eliminated. Emulsifying agents are added to the buffer solution to obtain the latex from dried-out shrub in which the rubber has coagulated to some extent. The latex is filtered from the fiber and water-insoluble materials, concentrated, and heated with pressure under steam in the presence of a dilute caustic alkali and subsequently coagulated.

To effect a quantitative separation of the latex rubber from the bagasse, the bagasse is remilled with fresh solution and such wash liquors may be used in continuous operation for subsequent extraction from fresh shrubs.

The latex obtained by this process consists of minute round particles, resembling *Hevea* latex exudate, varying in diameter from .75 to 3.0 microns, and in rapid Brownian movement. The fresh latex gradually, but incompletely creams on standing and without any appreciable coagulation. This guayule latex appears to be more stable toward coagulating agents than is that of *Hevea*. The prepared rubber is a tough elastic product resembling plantation rubber. It may be transparent and light in color, or dark depending on the methods of treatment and coagulation used. Sulphur, accelerators, antioxidants, and other inert materials may be added as to *Hevea* rubber.

[1] U. S. patent No. 2,119,030, May 31, 1938, to D. Spence, Carmel, Calif.

German Patents Relating to Vinyl Polymers—VII

M. Hoseh

PATENT (61)[1] describes a method for producing synthetic masses from polyvinyl alcohols and aldehydes. The reaction aided by promoters is a simple one if proper care is taken to remove the water liberated during this reaction. To this end the patent suggests two ways: to conduct the reaction in the presence of hygroscopic substances such as $CaCl_2$ or anhydrous Na_2SO_4, or to use a solvent not miscible with water. In this latter case the solvent, e. g., benzene, and the water are distilled over from the reaction mixture, whereupon the solvent and the water are separated in the usual way, and the solvent is returned for reuse. This method enables a reliable control over the product. The amount of water liberated is an accurate indication of the aldehyde used up. It is advisable to conduct this reaction in the presence of alcohols. The first step in this reaction is the formation of free polyvinyl alcohol and the ester of the added alcohol; the polyvinyl alcohol next reacts with the aldehyde liberating water.

The subject of (62) is a glass-like material obtained by polymerizing liquid, unsaturated organic compounds which solidify under the influence of heat. These compounds are poured into flat pans with movable walls and heated at approximately 70°C. The liquid, to which suitable promoters have been added, pulls the walls along as it solidifies and contracts. Several forms of pans are discussed.

Patent (63) describes the forming of polyvinyl alcohol-aldehyde-condensation products. The condensation product obtained by acid (e.g., H_2SO_4) condensation of polyvinyl alcohol and an aldehyde is mixed with suitable fillers and extenders, e.g., sawdust, ground slate, talc, pigments, etc., then sprayed or extruded under considerable pressure into chilled forms. The extruded material is heated up to 200°C., and the pressures used are around 300 atmospheres. This process is suitable for making buttons, compacts, etc.

A new method for obtaining polyvinyl alcohol is given in (64), whereby the polyvinyl alcohol is liberated from a compound containing it by treating the latter with a mono—or polyhydric alcohol. The reaction is catalyzed by acids or alkalis. Thus by choosing a starting material of the desired degree of polymerization a polyvinyl alcohol is obtained having the desired viscosity, solubility, and other properties.

The preparation of aqueous pastes from water insoluble polyvinyl compounds, notably from polystyrol, is described in (65). To prepare such a paste, first are mixed together an organic solvent for the polystyrol not miscible with water, a suitable emulsifier, and a slight amount of water. These components are mixed to a uniform paste. The polystyrol is gradually added to it while the whole is mixed or kneaded to form a uniform suspension of creamy consistency. Either the solvent, or water or both is added as needed during the kneading in order to impart the proper consistency. The ready mix is used as a lacquer for protective coatings, etc. These can be applied by brushing, spraying, or dipping. After the water evaporates the coated object is heated. The heat causes the lacquer to melt and give a smooth uniform surface. If desired, other substances may be incorporated into the paste along with the polystyrol.

Condensation products of polyvinyl alcohols and aliphatic or aromatic aldehydes are ordinarily insoluble in water. Patent (66) gives a method for obtaining water-soluble products from the above constituents. These results are achieved by using not the aldehydes, but their sulphonic acids. According to this method, the polyvinyl alcohol and the aldehydesulphonic acid are heated at boiling temperature until the product attains the desired viscosity. The condensation reaction is catalyzed by HCl, H_2SO_4, P_2O_5, $KHSO_4$, $AlCl_3$, $ZnCl_2$, and similar acid reacting substances. Suitable sulphonic acids are: acetaldehyde-, benzaldehyde-, and naphthaldehyde-sulphonic acids. The products are valuable adhesives, finishing compounds, and thickeners, and because of their property to precipitate protein matter they are valuable tanning aids.

Patent (67) describes a procedure for producing porous, spongy substances from polyvinyl compounds. The polymer is mixed with an expanding substance such as $(NH_4)_2CO_3$, methylene chloride, or both. The mixture is heated, and at the same time or subsequent to the heating a high vacuum is applied. If only a limited expansion is desired, the mixture is enclosed in a perforated mold of the desired dimensions and treated as above.

To avoid excessive temperature rises during the polymerization of styrols, the reaction is conducted under diminished pressure, or with the aid of indirect cooling, or both. If diminished pressure is resorted to, it is so adjusted that the temperature does not rise above 100°C. For indirect cooling is used a liquid having a boiling point of about 100°C. If excess heat is generated during the condensation reaction, it is spent to vaporize the cooling liquid. This method is the topic of (68).

Patent (69) would prevent the tendency of polymerization products of acrylic acid nitriles and its homologs to discolorize. Thus the monomers are treated with a 0.2N or 0.1N solution of manganic or permanganic acid or their salts. 0.01-0.05 gram-equivalent of oxygen is required per mol of the nitrile. The oxidizing solution may be acid, neutral or alkaline. If the discoloration is not prevented entirely, at least it is inhibited to a large extent.

Highly polymerized polyvinyl chloride is readily depolymerized and thus made soluble in low-boiling solvents by boiling the polymer in the presence of an acid, according to (70). The polyvinyl chloride is dissolved in a suitable solvent and boiled with an acid until samples show the desired solubility in low-boiling solvents. Both inorganic and organic acids as well as acid-reacting substances can be employed for this purpose. Thus among the appropriate compounds are HCl, H_2SO_3, H_2SO_4, P_2O_5, acetic acid, lactic acid, benzoic acid, strong sulphonic acids, the halides of Mg, Ca, Al, B, Si, as well as such organic compounds as are capable of yielding an acid, e.g., pyridene-piperidine-, betaine-hydrochlorides, etc.

As described in (71), the principle discussed in (53)[2] applies also to synthetic, high polymers of vinyl compounds. Thus concentrated metallic salt solutions are effective solvents for the vinyl polymers. The clear solutions obtained by heating and simultaneous agitating of the polymer in the metal salt solution are used for making thread, films, etc.

Olefins which cannot be polymerized ordinarily can be transformed to mixed, highly polymerized compounds according to (72). By this process such olefins as ethy-

[1] For details on patents see end of article.
[2] See India Rubber World, May, 1942, p. 139.

lene, propylene, butylene, cyclohexene, and their derivatives are polymerized together with compounds having an olefinic double-bond, notably vinyl acetate, styrol, acrylic acid, and similar compounds, the polymerization of which is an exothermic process. The end product is thereby greatly improved. Thus, whereas polystyrol has a shock resistance of 2.2 kg., a polymer of styrol and propylene has a shock resistance of 3.8 kg.

Patent (73) describes a process for the preparation of synthetic resins. Reaction products of diolefins and olefins or alkyl- or alkylenebenzenes, obtained with the aid of polymerization promoters, are heated with a drying or non-drying oil at a temperature of over 250°C in the presence of a polyhydric alcohol. If, however, a non-drying oil is used, the oil is esterified with a polyhydric alcohol before adding it to the mixture. The starting materials for this process are reaction products of: diolefins such as hexadiene, isoprene, butadiene, and dimethylbutadiene, and olefins such as amylenes; or diolefins and alkyl- or alkylenebenzenes, such as toluol, xylol, cymol, ethylbenzene, diethylbenzene, etc. These reaction products are heated with a drying oil at a temperature of 280-320° C. The amount of the drying oil and the duration of the heating depend on the desired results. The product is diluted with a suitable thinner to the desired viscosity and is used for primers, varnishes, lacquers, etc. Drying agents such as resinates or linoleates of Co or Mn may be added.

A novel and simple method for acetalizing of polyvinyl alcohol is described in (74). The polyvinyl alcohol is dissolved in a solvent which is gaseous at ordinary pressures and temperatures. SO_2 is particularly suitable for this purpose. The polyvinyl alcohol is heated in a bomb filled with SO_2 along with an aldehyde. At the end of the reaction the pressure is released, thus volatilizing SO_2. If desired, the bomb contents can be transferred into water, etc., which acts as a precipitating bath for the acetal.

Patent (75) gives an improved method for isolating chlorinated polyvinyl chloride as a fine-grained precipitate. Reference is made to the procedure given in (22).[3] The carbon tetrachloride, acting as solvent for the chlorinated product, is evaporated until approximately a 10% solution is obtained. The solution thereupon is cooled until incipient gelation takes place. Depending on the solute a temperature of 0 to —20°C. is required. To the cooled gel is added a third to a half of its volume of MeOH similarly cooled. The chlorinated polyvinyl chloride precipitates as a pure, granular, easily filterable product. The precipitate is washed with MeOH.

The preparation of condensation products from polyvinyl alcohols and carbonyl compounds is readily accomplished by the method outlined in (61). However, the removal of the solvent, which is not miscible with water, presents considerable difficulties. Patent (76) describes a method that removes this obstacle. Thus the solvent still containing the condensation product is emulsified with water with the aid of an emulsifying agent, and the solvent is distilled off from this emulsion. Two ways are open for this process. The first consists of adding water to the condensation mixture while stirring it vigorously, then submitting it to steam distillation until all of the solvent is removed. The other method is to emulsify the mixture with steam; then under vigorous stirring pour the emulsion into hot water containing an emulsifier. For either of these methods the following are suitable emulsifiers: soaps, alkylated and aralkylated naphthalenesulphonic acids, condensation products of fatty acids and hydroxyalkyl sulphonic or aminoalkylsulphonic acids, alcohol-sulphuric acid esters, condensation products of fatty acids and albumin degradation products, reaction products of alkylene oxides and high-molecular acids, alcohols, amines, etc. The effectiveness of these emulsifiers is enhanced by admixing to them sulphite liquor, water soluble alkylcellulose, polyvinyl alcohol, vegetable gum, tragacanth, etc. By employing this method the condensation product separates as a fine grained, easily washable substance.

Patent (77) gives a method for producing polymerized vinyl compounds insoluble in aromatic hydrocarbons. This is attained by adding to the monomeric aliphatic vinyl compound about 5% or less of divinyl benzene or its homologs, such as methyldivinyl-, ethyldivinyl-, vinylisopropenyl-, or isopropenyl-benzene. The method is applicable to vinyl esters and ethers, esters of acrylic, maleic, and crotonic acids, etc.

The subject of (78) is the improvement in strength and heat resistance of polystyrols, attained by a simple expedient of incorporating up to 5% of acrylic or methacrylic nitrile to the styrol monomer and polymerizing them together. The polymerization itself is as usual. This addition raises the shock resistance of the polymer approximately 100%, and its heat resistance by 10 to 15° according to Martens.

Mixed polymers of acrylic acid esters and acrylic nitriles, the latter in amounts of 20-40%, are insoluble in the usual solvents such as alcohol, gasoline, benzene, xylene, carbon tetrachloride, turpentine, and mineral oils, according to (79). The mixed polymers are used for making hose, membranes, coatings, etc. The resistance to any one of the mentioned solvents is determined by the composition. The usual fillers and plasticizers may be incorporated when chosen judiciously. The insolubility is further enhanced by heating the polymerization product for many hours at temperatures above 100°C. To make the desired article the mixture is partly polymerized, then cast in the proper mold, finally the polymerization is finished. Another way is to roll or press the finished polymer into shape by applying heat.

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(To be continued)

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Minor Emergency Sources of Natural Rubber in the United States[1]

THERE are thousands of species of trees, shrubs, vines, and smaller herbaceous plants that contain rubber, many of which are native to the United States or are known to grow under our conditions, though only a small proportion of the eligible species has been tested. Some are tropical or subtropical plants that probably would be confined to southern Florida, while others are native to or could be grown in dry regions like the southwestern states.

Cryptostegia

Two species of Madagascar rubber vines, *Cryptostegia grandiflora* and *Cryptostegia madagascariensis*, have been planted in many localities in Florida as ornamentals because of their handsome foliage and flowers. The first species is a large climber; while the second takes the form of a broad, rounded bush five or six feet high. A hybrid of the species also has been propagated and studied in Florida. Rubber obtained from *Cryptostegia* has been tested and found to be of good quality, but the present supplies of these plants are limited. The percentage of rubber in the roots, stems, and leaves is very low, running only 2% to 3%, and the cost of extraction of the rubber is high. Extraction of rubber from ornamental plants in Florida might yield small quantities of rubber; but, for immediate emergency use, propagation or reproduction would be slow and no appreciable tonnage could be expected from this source within the next several years. This is a plant that could be handled by machinery equipped for extracting rubber from guayule, but, because of the low rubber content, the extraction is inefficient and costly. Considering the low yield, the time required for production in volume, the difficulties of extracting, and the low percentage of rubber, *Cryptostegia* is not regarded as a practicable source of rubber in the emergency comparable with those recommended.

Milkweeds

Experiments also have been made with native rubber-bearing plants of the hot desert districts of southern California and Arizona. A promising species is one of the desert milkweeds (*Asclepias subulata*), with tapering, slender stems growing in clumps like a large bunch grass. A second desert milkweed, *A. erosa*, also has been tested and found to contain even higher amounts of rubber than *A. subulata*. Methods of cultivating these plants have been worked out, and they could be grown in large quantities in the desert districts. In cultivation tests the yields of rubber have been low so that it has never been possible to demonstrate more than 80 to 90 pounds of rubber per acre per year from either of these species. Processes of extracting the rubber and utilizing it commercially have not been developed. In addition to these two species of milkweed, attention has been given to the common broad-leaf milkweed, *A. aspira*, common to the eastern states, but it has proved less promising than either of the two desert milkweeds. Another plant, commonly known as California milkweed, but belonging to the composite family rather than to the true milkweed family, is *Stephanomeria virgata*. In spite of publicity recently given to this plant, it has been impossible to demonstrate that it contains an appreciable amount of rubber. At the present time no member of the milkweed group could be considered promising in comparison with the tested quality of guayule rubber.

Euphorbias

This group contains innumerable species of latex-bearing plants closely related to the true Para rubber tree. However only one of these has ever been an important source of crude rubber. This is *Euphorbia intisy*, native to Madagascar, which was introduced into the United States in 1928. Cultivation experiments with this plant in the United States have been disappointing. It has been impossible to obtain seeds, and reproduction by cuttings has been very slow. It takes a period of many years to grow the plant and the plant must be destroyed to obtain rubber. The common Christmas plant *Poinsettia* also is a member of this group and has been promoted and tested for rubber production. Reliable tests have demonstrated that the rubber content of this plant is too low for serious consideration.

Russian Rubber Plants of Interior and Middle Asia

Several plants have been discovered and tested in Russia for rubber production. Reports are that several of these have been cultivated on a fairly large scale. Of late, publicity has been given largely to the *kok-sagyz*, which is a species of *Taraxacum* or dandelion. Attempts have been made by this Department to obtain seeds or other propagating material of these plants, but these attempts have been unsuccessful, and no records are available from tests conducted in the United States. The current favorable reports on performance of these plants do not appear to be verified by records of actual field performance in Russia received from reliable sources. In contrast to the reported rubber content in the roots of 10 to 27%, recent information from Russia indicates that when grown on a large scale by Collective Farms the maximum percentage rubber is 3% to 5%, and the average 1% to 1.5%. From the same source it also appears that the average yield of the *kok-sagyz* root per acre is about one-half ton. On the basis of the maximum rubber content that would be only 50 pounds of rubber per acre, which is pitifully small. Other plants tested by the Russians are the so-called *tau-sagyz*, which is a species of *Soorzonera*, related to black salsify, and the *krim-sagyz*, also related to the dandelion. Results in Russia are less favorable than those from *kok-sagyz*.

Goldenrod

The late Thomas A. Edison discovered that of some thousands of species native to the United States which

[1] Released by the United States Department of Commerce, Washington, D. C.

he tested for rubber, the goldenrod showed the most promise in so far as rubber content was concerned. Cultivation experiments were initiated by Mr. Edison and later continued by the Department of Agriculture. Selections with improved yield of rubber were obtained, but up to the present it has not been possible to produce the rubber in a quality acceptable on the American market. The rubber heretofore produced, on being tested at the National Bureau of Standards, showed a tensile strength of approximately 50% of that of comparable compounds using Para rubber and a resistance to abrasion of only 35% of that of Para rubber. In addition satisfactory methods of extracting the rubber have not been devised so that the cost of the present method of extraction by chemical solvents is very high and inefficient. For certain uses rubber from goldenrod is acceptable despite the impurities, but it does not lend itself to large-scale substitution for *Hevea* rubber. Only a small amount of propagated material of improved strains of goldenrod is available at the present time, and a maximum planting of 60 acres in 1942 would be possible, followed by a twenty-fold increase in 1943. The use of unselected goldenrod is quite out of the question because of low percentage of rubber and small leaf yield.

Rabbit Brush

Many portions of the states of California, Arizona, Nevada, New Mexico, and Utah grow a species of *Chrysothamus*, known commonly as rabbit brush. This plant contains appreciable amounts of rubber, running up as high as 6% of the dry rubber content. Results in survey publications of 1919 indicate that appreciable quantities of rubber could be obtained from these wild plants. In many places, the rabbit brush occurs in almost pure stands, but such stands are limited to local areas, widely scattered over these six states. The work of collecting and transporting is possible, but would be very arduous and would make large demands upon man-hours of labor. The rubber has been extracted from rabbit brush by the method used for extracting rubber from guayule, and the rubber has been tested and found to be of good quality. The rubber extraction plant in existence at Salinas, Calif., could be utilized without modification for extracting rubber from rabbit brush, particularly from areas in the Mojave Desert and contiguous portions of California where some of the best stands have been located. It is estimated that as much as 30 to 40 thousand tons of rubber may be obtained from plants of this species actually growing, but at enormous expenditure of labor.

Osage Orange

Because of its milky juice osage orange or hedge apple, botanically known as *Maclura pomifora*, has attracted attention as a possible source of rubber. Interest in this plant dates back to before 1910, and studies have been conducted by many investigators. Tests conducted in the laboratories of the Department of Agriculture have failed to show even 1% rubber in the fruits of osage orange, and analyses of other parts of the plant have been equally disappointing.

Micro-Organisms

Synthesis of rubber by the use of bacteria or other micro-organisms has been suggested as a possibility. The idea is to inoculate expressed juice of rubber-bearing plants and increase the amount of rubber yield from a given weight of the plants. As the rubber-bearing plant itself synthesizes rubber, there is no reason to doubt the possibility provided the necessary elements or materials are in the expressed juice, or in the air and available to the micro-organisms, but successful use of such methods to produce rubber have not been demonstrated.

Polyolefins Reduce Swelling of Synthetic Rubbers in Mineral Oils[1]

RECENT publicized conclusions of investigations suggest that homogeneous mixtures of white mineral oil and diphenyl offer no advantages over mineral oils of known aniline point for determining the per cent. volume swelling of synthetic rubbers for special industrial purposes.

Samples of Neoprene Type G of commercial quality in sheet form were placed in Nujol-diphenyl mixtures containing 20, 45, 60, 70, and 80% Nujol. The per cent. volume increase was measured after one, two, three, four, six, and 12 weeks of immersion in individual stoppered bottles in a constant temperature cabinet at 70° ± 1°C. The A.S.T.M. method was used to ascertain volume change. Much swelling was observed in the mixtures rich in diphenyl, and in these cases equilibrium was not attained at the end of 12 weeks, as was also noted in experiments with mineral oils of low aniline point.

Compounds of Perbunan and "Thiokol" containing carbon black showed greater swelling in the mixture containing 30% diphenyl than would be expected from mineral oils of the same aniline point.

Compounds of Neoprene Type G, Perbunan Extra, and "Thiokol" DX in sheet form were placed in samples of a hydraulic oil, an SAE 30 motor oil, both containing polybutenes, and a mixture of a low aniline point mineral oil and Vistanex 7000. Per cent. volume increase and volume change were determined under the same conditions and by the same methods as for the mineral oil-diphenyl mixtures. It was found that the per cent. swelling followed the true aniline point.

The addition of polyolefins to mineral oils will reduce the tendency of such oils to swell synthetic rubbers. This tendency is measured by the aniline point of the mineral oil-polyolefin mixture. The logarithm of the percentage swelling varies inversely with the 50% aniline point. Care must be used to distinguish the aniline point from the simple haze point which is caused by the incompatability of the aniline and the polyolefin. The true cloud temperature of a 50-50 weight mixture of aniline and mineral oil is a dependable guide to the degree of swelling of a synthetic rubber immersed in mineral oils, and also in mineral oils which contain polyolefins.

[1] Abstracted from "Swelling of Synthetic Rubbers in Mineral Oils." P. O. Powers and H. A. Robinson, *Ind. Eng. Chem.*, May, 1942, pp. 614-17.

Additional Amendments to Rubber Orders

THE following are copies of three more amendments to orders relating to rubber and products thereof issued within the past month to further the rubber conservation program:

Amendment No. 9 to Supplementary Order No. M-15-b to Restrict the Use and Sale of Rubber[1]

SECTION 940.3 (Supplementary Order No. M-15-b) is hereby amended as follows:

1. By changing that part of paragraph (1) (3) thereof which precedes subparagraph (i) of said paragraph (1) (3) to read as follows:

(3) To manufacture products of the groups listed in List F; provided that no Person shall consume more Reclaimed and Scrap Rubber during each of the months of April and May, 1942, in the production of any such groups of products than a quantity determined (by weight) as follows.

2. By substituting "June 1, 1942" for "May 1, 1942" in that part of paragraph (1) (3) thereof which follows immediately after subparagraph (iii) of said paragraph (1) (3).

This Order shall take effect upon the date of its issuance.
Issued this 27th day of April, 1942.

J. S. KNOWLSON
Director of Industry Operations

Amendment No. 5 to Supplementary Order No. M-15-b-1

Section 940.5 (Supplementary Order No. M-15-b-1) is hereby amended as follows:

1. By inserting the following new subparagraph immediately after subparagraph (b) (14)

(15) Feeding Nipples List 15

2. By attaching thereto the attached additional list designated List 15.

This Order and the specifications set forth in the list attached hereto shall become effective on May 15, 1942.
Issued this 6th day of May, 1942.

J. S. KNOWLSON

Supplementary Order No. M-15-b-1 as Amended
List 15

Specifications for the manufacture of feeding nipples.

1. *Molded Type.*
The weight of rubber in each finished nipple shall not exceed .0105-pound.
2. *All Other Types.*
The weight of rubber in each finished nipple shall not exceed .007-pound.

Amendment No. 2 to Conservation Order No. M-124[2]

Section 1173.1 (Conservation Order No. M-124) is hereby amended to read as follows:

(a) *Applicability of Priorities Regulation No. 1.* This Order and all transactions affected thereby are subject to the provisions of Priorities Regulation No. 1 (Part 944), as amended from time to time, except to the extent that any provision hereof may be inconsistent therewith, in which case the provisions of this Order shall govern.

(b) *Restrictions on Sale and Delivery.* Except as provided in paragraph (d) below or as specifically authorized by the Director of Industry Operations, no person shall hereafter sell, or make delivery of, or purchase, order, or accept delivery of any rubber yarn, latex yarn or elastic thread.

(c) *Restriction on Knitting, Weaving and Other Uses.* Except as provided in paragraph (d) below or as specifically authorized by the Director of Industry Operations, no person shall hereafter knit, weave or otherwise process or use any rubber yarn, latex yarn or elastic thread.

(d) *Exceptions to Restrictions.* The restrictions imposed by paragraphs (b) and (c) above shall not apply to:

(1) Any rubber yarn, latex yarn or elastic thread which, prior to March 29, 1942, had been placed on a knitting machine, braider or loom.

(2) Any rubber yarn, latex yarn or elastic thread which, prior to March 29, 1942, had been removed from the vendor's container, wrapping, packing or "put-up" and placed on quills, cones, cops, spools, bobbins, tubes, beans or warps.

(3) Any rubber yarn, latex yarn or elastic thread which, on March 29, 1942, was in a retail merchant's stock as such, or in the possession of any individual not ordinarily engaged in the business of selling, knitting, weaving, or otherwise using such yarn or thread.

(4) Any rubber yarn, latex yarn or elastic thread to be incorporated in products required to be delivered under orders placed by or contracts held by any person with:

(i) The War Department of the United States,
(ii) The Navy Department of the United States,
(iii) The United States Maritime Commission,
(iv) The United States Coast Guard, or
(v) Any agency of the United States Government for materials, supplies, or equipment to be delivered to, or for the account of, the Government of any country pursuant to the Act of March 11, 1941, entitled "An Act to Promote the Defense of the United States" (Lend-Lease Act):

provided, however, that such rubber yarn, latex yarn or elastic thread shall be only used to the minimum extent necessary to comply with the specifications of the prime contract involved.

(5) Any rubber yarn, latex yarn or elastic thread to be used in the manufacture of one or more of the items in Group 15, List B of Conservation Order No. M-15-b, as amended, as of the date of such sale, delivery or use of such yarn or thread.

(e) *Reports.* Each person having in his possession 25 or more pounds of rubber yarn, latex yarn and elastic thread on April 25, 1942, shall, on or before May 11, 1942, file with the War Production Board, Washington, D. C., Reference M-124, a report on Form PD-433 of all rubber yarn, latex yarn and elastic thread in his possession or under his control as of the date of such report.

(f) *Appeal.* Any person affected by this Order who considers that compliance herewith would work an exceptional hardship upon him may appeal to the War Production Board, setting forth the pertinent facts and the reasons such person considers that he is entitled to relief. The Director of Industry Operations may thereupon take such action as he deems appropriate.

(g) *Violations.* Any person who wilfully violates any provision of this Order or who, in connection with this Order, wilfully conceals a material fact or furnishes false information to any department or agency of the United States is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of, or from processing or using, material under priority control and may be deprived of priorities assistance.

(h) *Communications to the War Production Board.* All communications concerning this Order and all reports which may hereafter be required to be filed hereunder shall, unless otherwise directed, be addressed to:

"War Production Board
Washington, D. C., Reference M-124."

Issued this 29th day of April, 1942.

J. S. KNOWLSON

[1] Title 32—National Defense, Chapter IX—War Production Board, Subchapter B—Division of Industry Operations, Part 940—Rubber and Products and Materials of Which Rubber Is a Component.

[2] Title 32—National Defense, Chapter IX—War Production Board, Subchapter B—Division of Industry Operations, Part 1173—Rubber Yarn and Elastic Thread.

Rubber Reserve Co. Circulars

Circular No. 1 on the Distribution of Rubber

General

1. Rubber Reserve Co. will sell rubber to manufacturers ex dock or ex warehouse or F. O. B. cars New York, Boston, Baltimore, New Orleans, Los Angeles and/or San Francisco, at the option of Rubber Reserve Co. at the prices listed on the attached schedule.

2. Rubber will be sold on a 10% examination and net test weight basis, and payment therefor will be required at the time of delivery, by certified check payable to Rubber Reserve Co. It will, therefore, be necessary for manufacturers or their dealer agents to weigh and inspect at point of delivery. No adjustments will be made after delivery and acceptance. Rubber Reserve Co. will absorb the cost of the weighing and inspecting in all cases, but if delivery is made ex warehouse, the charge for reweighing and reinspecting shall not exceed 80c per ton.

3. Requests for the purchase of rubber should be addressed to Sales Department, Rubber Reserve Co., 811 Vermont Ave., Washington, D. C., and mailed at least 30 days in advance of the date on which delivery is desired. All such requests must state clearly the type or types of rubber required, the quantity of each type or types, and the desired delivery date. If it is the manufacturer's expectation that the delivery will be taken in several lots, a statement to this effect should be included in the request.

4. The amount of rubber which Rubber Reserve Co. will sell to any manufacturer for consumption during any particular month will be governed by the amount of rubber which the manufacturer is permitted to consume, pursuant to the terms of General Preference Order, Number M-15 as amended and supplemented, issued by the Division of Priorities of the Office of Production Management on June 20, 1941.

5. Upon receipt of the manufacturer's request, Rubber Reserve Co. will issue and forward to the manufacturer, by Registered Mail, a Crude Rubber Purchase Permit, in triplicate, authorizing the manufacturer to receive the amount of rubber to which it is entitled. If it is indicated in the request that delivery is desired in several lots, a permit will be issued to cover each delivery. The permit must be executed in triplicate and delivered to the Agent of Rubber Reserve Co. at the time the rubber is received. The triplicate copy, which will represent an invoice, will be returned to the manufacturer for its files.

A sample copy of the permit is attached hereto for informative purposes.

Distribution by Distributing Agent

1. D. D. Haldane, 95 Broad St., New York, N. Y., has been appointed as Distributing Agent for Rubber Reserve Co.

2. In order that there may be the least possible dislocation in the usual channels of distribution, it is assumed that most manufacturers will prefer to have dealers act as their agents in purchasing rubber from Rubber Reserve Co., and in connection therewith, render certain services as has been the custom in the past, such as weighing, inspecting, shipping and financing. However, this procedure is not obligatory and, should they so desire, manufacturers may arrange for their own deliveries, subject to the conditions contained in Paragraph 2 under "GENERAL."

[1] The Distributing Agent has since moved to 15 William St. Editor.

Ru R Form No. 13

RUBBER RESERVE COMPANY
811 Vermont Avenue
WASHINGTON, D. C.

No. .....

Date .....

CRUDE RUBBER PURCHASE PERMIT

..... (Company Name)

whose principal office is located at ..... (Address)

is authorized to purchase crude rubber of the grade, in the quantity, and at the price per pound listed below, for delivery during the month of ....., 194.., ex dock or ex warehouse or F.O.B. cars New York, Boston, Baltimore, New Orleans, Los Angeles and/or San Francisco, at the option of Rubber Reserve Company.

Quantity	Grade	Price

When the purchase is made direct from Rubber Reserve Company, the RUBBER MANUFACTURER'S ACCEPTANCE shall be executed by the manufacturer and the permit, accompanied by a certified check, delivered to the representative of the Company from whom the rubber is received.

When the order is placed through a dealer, the RUBBER MANUFACTURER'S ENDORSEMENT, authorizing the dealer to act as agent, shall be executed by the manufacturer and when the rubber is received, the DEALER'S ACCEPTANCE shall be executed by the dealer, and the permit, accompanied by a certified check, delivered to the Distributing Agent.

RUBBER RESERVE COMPANY

..... *Pres.* ..... *Vice Pres.* ..... *Asst. to Vice Pres.*

THIS PERMIT IS NON-NEGOTIABLE AND NON-TRANSFERABLE

RUBBER MANUFACTURER'S ENDORSEMENT

We hereby constitute and appoint .....

dealer in crude rubber, located at .....
as our official agent to purchase the rubber described in this permit, for delivery during the month of ....., 194..

..... Company
..... Official Signature
..... Title

DEALER'S ACCEPTANCE

We have accepted the below itemized crude rubber as agent for .....
..... as authorized by this permit.

Date	Mark	Number of Packages	Net Weight	Grade	Price	Amount

We hereby certify that the above is a true and exact statement of the transaction covered by this permit.

..... Company
..... Official Signature
..... Title

RUBBER MANUFACTURER'S ACCEPTANCE

We have accepted the below itemized crude rubber, as authorized by this permit.

Date	Mark	Number of Packages	Net Weight	Grade	Price	Amount

We hereby certify that the above is a true and exact statement of the transaction covered by this permit.

..... Company
..... Official Signature
..... Title

The above rubber covered by Rubber Reserve Company Contract Nos. .....
....., and/or Warehouse Receipt Nos. .....
was delivered from ..... on ..... (Name and location of warehouse or vessel) (Date)

..... *Distributing Agent*

3. In order to avoid unnecessary handling charges, deliveries will be made ex dock wherever possible.

4. To facilitate distribution by the Distributing Agent, the rubber presently stored in warehouses of the American Dock Co. and Pouch Terminal, Inc., New York City, will be used as a stockpile. All distributions to manufacturers will be made from such warehouses in accordance with the established custom of the trade, and exceptions will be made only when the requested type of rubber is not available. These stockpiles, consisting of various grades of rubber deemed adequate to satisfy ordinary consumption demands, will be replenished from time to time by incoming shipments.

5. In cases where the services of a dealer are utilized, the RUBBER MANUFACTURER'S ENDORSEMENT on the reverse side of the permit must be executed by the manufacturer and the permit in triplicate forwarded to the respective dealer. The dealer will then present the permit to the Distributing Agent, who will arrange for the delivery of the rubber described therein. Upon receipt and acceptance of the rubber, the dealer will execute the DEALER'S ACCEPTANCE in triplicate and surrender the permit to the Distributing Agent, accompanied by a certified check covering the purchase price of the rubber. The Distributing Agent will then sign the permit in triplicate, in the space provided therefor, and deliver the triplicate copy thereof to the dealer for transmittal to the manufacturer.

6. Dealers who act as agents for manufacturers and reweigh and reinspect rubber at warehouses should, at the end of each month, render to the Distributing Agent an invoice covering charges for such services on the basis of not more than 80c per ton. The Distributing Agent will check the invoice against the deliveries and, if found to be correct, indicate his approval thereon and forward the invoice to Rubber Reserve Co. for payment.

7. The Rubber Trade Association of New York, Inc., has prepared the following schedule of fixed charges (exclusive of any charges for weighing and inspecting which will be absorbed by Rubber Reserve Co.) to be made by dealers when acting as agents for manufacturers:

750 Tons and over	1/16c	per pound	Cash 20 days
100 to 750 Tons and over	3/16c	per pound	Cash 30 days
30 to 99 Tons and over	1/4c	per pound	Cash 30 days
10 to 29 Tons and over	1/2c	per pound	Cash 30 days
Less than 10 Tons and over	3/4c	per pound	Cash 30 days
Case lots	2c	per pound	Cash 30 days

The foregoing charges (which are for the account of the manufacturer and not Rubber Reserve Co.) are intended to apply to the entire volume of rubber handled for any manufacturer during a single month, irrespective of the number of individual deliveries made or the number of dealers involved.

Distribution by Buying Agents

1. It is assumed that the requirements of certain manufacturers will be sufficient in amount to permit acceptance of the entire quantity of rubber covered by one or more bills of lading or warehouse receipts. In any case in which a manufacturer desires a quantity of rubber less than that specified by a single bill of lading or a single warehouse receipt, delivery will be made through the Distributing Agent as provided under "DISTRIBUTION BY DISTRIBUTING AGENT" unless Rubber Reserve Co. determines otherwise. The same procedure will be followed in any case in which a manufacturer desires to utilize the services of a dealer.

2. In order to avoid unnecessary handling charges, deliveries will be made ex dock wherever practicable. Arrangements will also be made, in so far as possible, to permit manufacturers which operate Eastern Plantations to purchase the rubber produced on their respective plantations for use in their American factories.

3. In certain cases if a manufacturer can accept the entire quantity of rubber covered by one or more bills of lading or warehouse receipts, it is believed the Buying Agents of Rubber Reserve Co. can handle the delivery. If the rubber is delivered ex dock to a manufacturer, or to a dealer-agent of a manufacturer not represented by the Buying Agent making the delivery, it is assumed that such manufacturer will have its dealer-agent representative present when the rubber is weighed and inspected. If, however, the Buying Agent is the representative of the manufacturer which is purchasing the rubber, the weighing and inspecting thereof will be arranged for by the Buying Agent. When the rubber is accepted, the RUBBER MANUFACTURER'S ACCEPTANCE or DEALER'S ACCEPTANCE on the reverse side of the permit will be executed by the purchaser, and the permit in triplicate, accompanied by a certified check representing the purchase price of the rubber, delivered to the Buying Agent. The Buying Agent will then sign the permit in triplicate in the space provided for the signature of the Distributing Agent, and deliver the original, accompanied by said certified check, to the Federal Reserve Bank of New York. The duplicate copy should be immediately forwarded to Rubber Reserve Co. and the triplicate copy returned to the manufacturer.

4. If it is not possible to make deliveries ex dock to manufacturers represented on the Buying Committee, delivery will be effected ex warehouse, and the rubber so delivered, wherever possible, will be rubber which was originally purchased for the account of Rubber Reserve Co. by the Buying Agent whose company is to receive the delivery. In cases of this nature, the Federal Reserve Bank of New York will be authorized to deliver the warehouse receipts to the manufacturer, upon receipt of a certified check covering the purchase price.

5. If the request of a manufacturer who is not represented on the Buying Committee cannot be satisfied by a delivery ex dock, or if it is not feasible to employ one of the Buying Agents to handle the transaction, delivery will be made ex warehouse in the manner considered most practicable, preferably through the delivery to the manufacturer, or to his dealer-agent, of a warehouse receipt against a certified check covering the purchase price.

6. In cases where manufacturers arrange for the reweighing and reinspecting of the rubber prior to taking delivery thereof, invoices for the charges, based upon not more than 80c per ton, should be rendered monthly and forwarded to the Buying Agent of Rubber Reserve Co. who delivered the rubber. After verifying the correctness of the charges, the Buying Agent will indicate his approval thereof and forward the invoice to Rubber Reserve Co. for payment.

RUBBER RESERVE CO.

CRUDE RUBBER SELLING PRICES FOR DELIVERY EX DOCK OR EX WAREHOUSE OR F. O. B. CARS NEW YORK, BOSTON, BALTIMORE, NEW ORLEANS, LOS ANGELES AND/OR SAN FRANCISCO AT THE OPTION OF RUBBER RESERVE CO.

GRADE	PRICE
#1X Ribbed Smoked Sheets in bales	22 1/2
#1X Ribbed Smoked Sheets in cases	22 1/2
#1 Ribbed Smoked Sheets in cases	22 7/16
#1 Ribbed Smoked Sheets in bales	22 7/16
#2 Ribbed Smoked Sheets in bales	22 1/4
#3 Ribbed Smoked Sheets in bales	22
#4 Ribbed Smoked Sheets in bales	21 3/4
#5 Ribbed Smoked Sheets in bales	20 5/8
#1X Thick Pale Latex Crepe in cases	23 5/16
#1X Thick Pale Latex Crepe in bales	23
#1 Thick Pale Latex Crepe in cases	23 3/16
#1 Thick Pale Latex Crepe in bales	22 7/8
#2 Thick Pale Latex Crepe in cases	22 1/8
#2 Thick Pale Latex Crepe in bales	22 1/8
#3 F. A. Q. Thick Palish Latex Crepe in cases or bales	21 7/8
#1X Thin Pale Latex Crepe in cases	23 5/16
#1 Thin Pale Latex Crepe in cases	23 3/16
#2 Thin Pale Latex Crepe in cases	22 1/8
#2 Thin Pale Latex Crepe in bales	22 1/8
#3 F. A. Q. Thin Palish Latex Crepe in cases or bales	21 7/8
#1X Thick Brown Crepe in bales	21 3/8
#2X Thick Brown Crepe in bales	21 1/16
#3X Thick Brown Crepe in bales	20
#1X Thin Brown Crepe in cases	21 3/8
#1X Thin Brown Crepe in bales	21 3/8
#2X Thin Brown Crepe in cases	21 1/16
#2X Thin Brown Crepe in bales	21 1/16
#3X Thin Brown Crepe in cases	20
#3X Thin Brown Crepe in bales	20
#1 Thick Remilled Blanket Crepe in bales	21 3/8
#2 Thick Remilled Blanket Crepe in bales	21 1/4
#3 Thick Remilled Blanket Crepe in bales	21 1/8
#4 Thick Remilled Blanket Crepe in bales	20 5/8
#1 Thin Brown Remilled Crepe in bales	21 1/4
#2 Thin Brown Remilled Crepe in bales	21 1/16
#3 Thin Brown Remilled Crepe in bales	20 5/8
#4 Thin Brown Remilled Crepe in bales	20
#1 Rolled Brown in bales	17 15/16
#1 Smoked Blanket	21 1/8
#2 Smoked Blanket	21
Claro Brand #1X RSS in cases	22 1/8
#1X RSS European Estates Trimmings in cases or bales	22
Sole Crepe Trimmings and/or #1X Thin Pale Crepe Trimmings in cases or bales	22 1/8
R.C.M.A. Watermarked Crepe Type #16 in cases	26 3/8
R.C.M.A. Watermarked Crepe Type #17 in cases	25 7/8
R.C.M.A. Watermarked Crepe Type #18 in cases	24 3/8
Sole crepe (Harrison and Crossfield and R.C.M.A.) in cases	28 1/8*

* Plus import duty.

Issued September 12, 1941.

Circular No. 2 on the Distribution of Normal or Concentrated Latex, Deproteinized Rubber and Sprayed Rubber

Ru R Form No. 15

RUBBER RESERVE COMPANY
811 Vermont Ave.
WASHINGTON, D. C.

No. .....

Date .....

PERMIT FOR PURCHASE OF NORMAL OR CONCENTRATED LATEX; DEPROTEINIZED RUBBER OR SPRAYED RUBBER

..... (Company Name)

whose principal office is located at ..... (Address)

is authorized to purchase Liquid Latex, Deproteinized Rubber or Sprayed Rubber of the grade and in the quantity listed below, for delivery during the month of ....., 194..., or as soon thereafter as the material is available.

LATEX

U. S. Gallons	Net Dry Pounds	Percent of Concentration	Delivery in Drums or Tank Cars

DEPROTEINIZED RUBBER		SPRAYED RUBBER	
Pounds	Grade	Pounds	Grade

The purchaser shall forward the original and duplicate copies of this permit to the distributor and retain the triplicate. The distributor shall, upon effecting delivery of the rubber authorized above, execute the certificate on the reverse side hereof, return the original to Rubber Reserve Company, and retain the duplicate copy.

RUBBER RESERVE COMPANY

..... Pres. ..... Vice Pres. ..... Asst. to Vice Pres.

THIS PERMIT IS NON-NEGOTIABLE AND NON-TRANSFERABLE

DISTRIBUTOR'S CERTIFICATE

We hereby certify that the rubber listed below was delivered to .....

on ....., 194...

LATEX

Number of Drums	Number of Tank Cars	U. S. Gallons	Total Net D. R. C.	Percent of Concentration	Price Per Gallon	Price Per Pound

DEPROTEINIZED RUBBER

Net Pounds	Grade	Price

SPRAYED RUBBER

Net Pounds	Grade	Price

..... Company

..... Official Signature

..... Title

1. The procedure outlined herein will become effective on November 1, 1941.

2. For the present, at least, Normal or Concentrated Latex, Deproteinized Rubber and Sprayed Rubber will be distributed to manufacturers by importers acting under the supervision of Rubber Reserve Co. rather than direct by Rubber Reserve Co., but in order to secure these types of rubber, manufacturers must obtain a permit for the purchase thereof from Rubber Reserve Co.

3. Requests for the purchase of these types of rubber should be addressed to Sales Department, Rubber Reserve Co., 811 Vermont Ave., Washington, D. C., and mailed at least 30 days in advance of the date on which delivery is desired. All requests for the purchase of Normal or Concentrated Latex must state clearly the type or types required, the quantity of each type or types in U. S. Gallons and net dry pounds, the percentage of concentration, the desired delivery date and whether delivery will be taken in drums or tank cars. All requests for the purchase of Deproteinized Rubber and Sprayed Rubber must state clearly the type of rubber required, the quantity of each type and the desired delivery date.

A sample copy of the permit is attached hereto for informative purposes.

4. The amount of these types of rubber which any manufacturer will be permitted to purchase for consumption during any particular month will be governed by the amount of rubber which the manufacturer is permitted to consume, pursuant to the terms of General Preference Order, Number M-15 as amended and supplemented, issued by the Division of Priorities of the Office of Production Management on June 20, 1941.

5. Upon receipt of the manufacturer's request, Rubber Reserve Co. will issue and forward to the manufacturer, by Registered Mail, a Permit to Purchase Normal or Concentrated Latex, Deproteinized Rubber or Sprayed Rubber, authorizing the manufacturer to receive the amount of rubber to which it is entitled. If it is indicated in the request that delivery is desired in several lots, a permit will be issued to cover each delivery.

6. In every case the distributer, after making delivery of the rubber provided for by the permit, will execute the Distributer's Certificate on the reverse side thereof, and immediately return the permit to Rubber Reserve Co. The duplicate copy may be retained by the importer for its files.

7. The procedure outlined herein does not in any way affect bona fide contracts for the purchase of Normal or Concentrated Latex, Deproteinized Rubber and Sprayed Rubber which were executed prior to November 1, 1941.

Issued September 22, 1941.

Amendment to Circular No. 2

Paragraph No. 1 of Circular No. 2, which outlines the procedure to be followed by manufacturers in requesting permits for the purchase of Normal or Concentrated Latex, Deproteinized Rubber and Sprayed Rubber, is hereby amended as follows:

1. The procedure outlined herein will become effective on *December 1, 1941.*

In view of the fact that the effective date has been postponed from November 1, 1941, to December 1, 1941, distribution of Normal or Concentrated Latex, Deproteinized Rubber and Sprayed Rubber during the month of November will be handled in the usual manner, and no permits will be required.

Permits for December delivery should be secured as outlined in Circular No. 2.

Issued October 10, 1941.

(To be continued)

EDITORIALS

U. S. Government Rubber Laboratory

IT BECOMES daily more apparent that the rubber used during the next two or three years at least, will be drawn from a great many different sources. This will greatly multiply the problems of the manufacturer and rubber technologist in producing satisfactory articles in a reasonable time and with some semblance of a reasonable cost.

During the past decade prior to World War II we saw a tremendous amount of time and money spent on efforts to standardize and control the quality of crude rubber delivered to the manufacturer, in order to facilitate its use with the minimum of losses due to processing tie-ups. Definite progress was made, but considerable variations between shipments of rubber were still experienced, and pilot testing and blending were an essential part of the control necessary to maintain production free from expensive delays.

We are now about to enter upon a period in the rubber industry which will undoubtedly surpass that period of the early 1920's when practically every shipment of rubber was a new problem in processing as regards compounding, curing, and finishing. Of course great advances have been made in the chemistry and technology of rubber and its compounding ingredients since that time, but just how much value they will be in the use of the various "rubbers" that will be available from now on is open to question. As fast as our stockpile of crude natural rubber is used up, it will be replaced to a small degree by crude rubber from new sources including guayule. Our major replacements will soon be the various synthetic rubbers rather than natural rubbers, and with these our knowledge of manufacture and processing is to all practical purposes somewhat limited.

Among the duties of the Rubber Coordinator are found the following "coordinate and exercise general supervision over all work within the War Production Board relating to military or civilian specifications involving the use of rubber" and "Represent the chairman of the War Production Board in relation to the activities of the Reconstruction Finance Corp. or any subsidiary thereof, and the Office of the Petroleum Coordinator for National Defense, with respect to: (a) The provision of additional facilities for the production of synthetic rubber or any of the raw materials therefor; (b) The stockpiling of rubber; (c) The purchase or sale of rubber or rubber products; (d) The financing of additional production facilities, or of transactions in rubber or rubber products."

It is the suggestion of this column that in order to aid in carrying out the duties outlined above that there be established by the Rubber Coordinator a Government Rubber Laboratory to make possible the proper evaluation of the many types of rubber to be used by the manufacturers from now on and to establish standards and classifications for their most efficient use. Such a laboratory might be incorporated as part of the National Bureau of Standards and could also avail itself of a certain number of commercial testing laboratories and laboratories of different rubber manufacturing companies in the various sections of the country as subdivisions of the main laboratory in order to save time in obtaining prompt results. The information obtained by the Government Rubber Laboratory and its subdivisions should be of invaluable aid to manufacturers in predetermination of processing details for the various lots and types of rubbers as received; and since all rubbers are under government allocation, information as to what to expect with their use should properly come from this central source.

Specifications for methods of testing and final requirements of finished products have been worked out in great detail by the A.S.T.M. Committee D-11 for Rubber Products, which represents the producer and the consumer of the rubber industry, and by the United States Department of Commerce, National Bureau of Standards, which primarily represents the United States Government as the consumer in this case in dealing with the private manufacturer. The results of all this work and changes in specifications, when required, should be brought under the authority of the Government Laboratory. The Division of Rubber Chemistry, A. C. S., with its local sections throughout the country is of prime importance as a means of contact with chemists and technologists in the rubber and associated industries and as a means by which the results of discussion of the work of the Government Laboratory may be quickly obtained.

A far-reaching and important step was made on March 31, 1942, by the appointment of a Rubber Coordinator in the War Production Board in order to provide a central authority for bringing about the direction of our all important effort in the use and conservation of our rubber resources and planning for new sources of supply. Advisory committees from the important product groups of the industry have been appointed by the War Production Board, and it is suggested that their work would be greatly facilitated by the coordinative nature of the work of the Government Laboratory, if instituted.

As a noteworthy example of a localized attempt along similar lines to organize and obtain the necessary knowledge and data to aid the industry in the period that lies ahead should be mentioned the "Rubber & Plastics Research Center" proposed by Detroit Rubber & Plastics Group, Inc. By means of donations of money and equipment by various industrial and educational institutions, work in full-credit courses in the Department of Chemical Engineering of Wayne University will be started next fall. Certainly this instance of pioneering effort by a combination of private individuals and institutions should indicate the necessity of prompt organization on a national scale of our technical and scientific work in connection with the valuation of our rubber supplies, their processing characteristics, and the specifications for the finished products.

What the Rubber Chemists Are Doing

A Low Heat Generation Channel Carbon Black

C. R. Johnson[1]

ONE of the principal problems demanding the attention of the tire industry at this time is to find methods to reduce the heat generated in large-size tire treads. There are two reasons for the importance of this work at the moment. First is the requirement that most military-type tires must be able to stand much more severe service conditions than civilian tires, including the ability to be driven at high overloads in very hot climates. Second is the increased use of reclaim in many types of military and civilian bus and truck tires. It is known that use of reclaim causes greater heat generation.

To meet these requirements the Continental Carbon Co. has produced a new-type channel carbon black which tests indicate will cause less heat generation in a tire tread stock than produced by the regular channel blacks. This black is called "Continental AA."

This article compares "Continental AA" with a standard channel black now in use in the rubber industry.

Methods of Testing

To determine the relative ability of a tread stock to withstand heat generated by continued flexing of a tire in service, a Goodrich flexometer[2] was used. This machine applies a definite compressive load to the bottom surface of a test piece and an additional high frequency cyclic compression of a definite amplitude to the upper face. Although the temperature rise of the sample is also measured, the most useful data obtained are the time required to produce complete breakdown or blowout of the sample under the given conditions of testing.

As a measure of the plasticity or ease of processing of the carbon black mixes, tests were made on the Firestone plastometer[3] which extrudes the stock through a die; the time of extrusion of a definite volume is recorded.

Physical Properties in Tread Stock

For the purpose of testing various types of carbon black the following tire tread stock test formula was used:

Smoked Sheet	100.
Carbon Black	50.
Pine Tar	1.5
Stearic Acid	4.
Zinc Oxide	3.
Mercaptobenzothiazole	1.
Phenyl-Beta-Naphthylamine	1.
Sulphur	3.

A comparison between "Continental AA" and Continental D is given in Table I. Continental D is the medium-cure, medium processing black largely used for tire treads in normal times. These results indicate that "Continental AA" produces stock which runs considerably longer on the Goodrich flexometer before blowout occurs. The Firestone plastometer tests also show that "Continental AA" produces easier processing tread stock.

TABLE 1

	Continental AA	Continental D
Properties of Blacks:		
D. P. G. Absorption	38.2%	43.4%
Volatile Matter	4.18%	5.20%
Properties of Tread Stock: (All tests made at optimum cure, 45 minutes at 280° F.)		
Modulus at 400% (psi)	2550.	2420.
Tensile Strength (psi)	4520.	4490.
Elongation at Break	585%	580%
Time of Blowout on Goodrich Flexometer (Min.)	16.5	11.9
Time for Extrusion on Firestone Plastometer (Sec.)	5.2	8.7

Note: Goodrich flexometer blowout test run under following conditions: weight = 48.5 lbs.; stroke = 0.25 in. Firestone plastometer extrusion test run under following conditions: diaphragm pressure = 10 lbs.; per sq. in. temperature = 190° F.

[1] Technical director, Continental Carbon Co., 295 Madison Ave., New York, N. Y.
[2] Lessig, *Ind. Eng. Chem.*, Anal. Ed., 9, 582 (1937).
[3] Dillon, *Rubber Chem. Tech.*, 9, 496 (1936).

A.S.T.M. Annual Meeting

MORE than 100 technical papers and reports are scheduled for presentation in 18 technical sessions at the forty-fifth annual meeting of the American Society for Testing Materials to be held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 22 to 26. There will also be about 150 meetings of technical committees. The committee reports are expected to be of more than usual interest, since each group will seek to have its specifications as up to date as possible for inclusion in the "Book of Standards" scheduled for late November publication.

Emergency Changes

Emergency revisions recently developed by A.S.T.M. Committee D-11 on Rubber Products to conserve critical materials modified insulated wire and cable specifications in Class AO, 30% *Hevea* rubber compound (D 27) to permit conductors coated with tin, lead, or lead-alloy, and made reference to the new emergency specifications for lead-alloy coated copper wire ES-1, which give tests for continuity and related properties. Some of the changes relate to cable cotton tape, and one provides that instead of being frictioned on both sides and thoroughly filled with a rubber compound, it "shall be treated on one side with an insulating compound of a nature not injurious to the wire insulation." These changes also affect standards for insulated wire performance compound (D 353), heat resisting rubber compound (D 469), and ozone-resistant-type insulation (D 574).

In the specifications for insulated wire and cable (D 353) tensile strength was reduced from 1200 to 850 min. psi., and elongation at rupture from 400% to 300%. A marked reduction was made in tensile strength requirements after 48 hours in the oxygen pressure test of 600 min. psi., and other physical requirements were deleted. For rubber sheath compound (D 532) tensile strength was reduced from 3500 to 3000 min. psi.; elongation at rupture from 500 to 400; and requirements on tear resistance and tensile strength at 200% elongation deleted.

Approval of emergency changes on cotton rubber-lined fire hose (D 296) are expected after subcommittee study.

Emergency Alternate Federal Specifications recently received by the A.S.T.M. include E-HH-T-101a, Friction Tape; E-HH-T-111a, Rubber Insulating Tape; E-J-C-103, Rubber-Insulated Cable and Wire, Building Type (0 to 5,000-volt service); and E-ZZ-H-451a, Rubber-Lined Cotton Fire Hose.

The Cotton Yarn Appearance Standards, developed jointly by the A. S. T. M. and the Agricultural Marketing Administration, United States Department of Agriculture, are now being produced by the A. S. T. M. and may be secured from the Society's headquarters. The standards were formerly available from the Department of Agriculture, but the Society was asked to reproduce the charts and market them.

Somerville at Detroit Group

THE Detroit Rubber & Plastics Group, Inc., held a dinner meeting May 8 at the Detroit Leland Hotel, Detroit, Mich., with about 200 members attending. A. A. Somerville, of the R. T. Vanderbilt Co., New York, N. Y., in a paper, "Latest Dope on Synthetic Rubber as Related to Accelerators and Plasticizing and High Temperature Testing", gave detailed information on compounding Buna S for tire-tread stocks.[1] John Dudley, Chrysler Corp., reported on the Group's educational project in cooperation with Wayne University, Detroit, and said that a non-credit course is now in progress. Fully accredited courses in rubber and plastics technology are planned for the Autumn 1942 term. The Group is accepting donations of laboratory equipment and cash to aid completion of the project.

[1] See also New Publication, "Compounding of Buna S", p. 289.

A. C. S. Meeting

THE one hundred and third meeting of the American Chemical Society held in Memphis, Tenn., April 20-24, was attended by 2,324 members of 16 divisions. Papers presented at 61 group meetings included 331 by 517 authors. Although the Division of Rubber Chemistry did not meet, some papers relating to ingredients associated with the production of synthetic rubber were read in the sessions of the Division of Paint, Varnish, and Lacquer Chemistry. Abstracts of four such papers follow:

Infra-red Data on the Structure of Polystyrene. A new infra-red test for the presence of methyl groups in hydrocarbons has been applied in the case of polystyrene. The test hinges on the presence or absence of an infra-red absorption band at 3.38 microns (2,960 cm.$^{-1}$), requiring a higher resolving power than is obtained with the usual rock-salt prism spectrograph. In the present instance, a prism of lithium-fluoride has been used, and the infra-red spectra of several examples of compounds are presented to demonstrate the validity of the test.

Applied to polystyrene, this test has shown that no significant number of methyl groups is present. In the light of this fact, a discussion is given of the origin of the 7.35-micron (1,360 cm.$^{-1}$) band of polystyrene which can no longer be regarded as indicating the presence of methyl groups. Other features of the infra-red spectrum are discussed in relation to molecular structure. N. Wright.

The Fractionation of Polystyrene. Polystyrene samples prepared under different conditions were fractionated by preferential solubility in solvent-non-solvent systems. Polystyrene was dissolved in methyl ethyl ketone, and methanol or acetone was added until a gel phase began to appear. The mixture was warmed to dissolve the gel, and the desired gel fraction was obtained by slowly cooling the mixture.

Some of the properties of fairly homogeneous polystyrene fractions were investigated. Phase diagrams for several ternary systems were obtained.

The relation between specific viscosity and concentration was determined for each of the fractions.

Several mixtures of different fractions were prepared. The molecular weight distribution curves of these mixtures could be considered to be known. These prepared mixtures were subsequently fractionated in order to determine directly the resolving power of the fractionation method.

A theory of polymer fractionation was developed, based upon the work of Schultz, Huggins, and Flory. The data obtained in the experimental investigation are interpreted in terms of this theory. T. Alfrey and H. Mark.

Viscosity and Cryoscopic Studies of Polystyrene. Discussion of Staudinger's Viscosity Rule. From cryoscopic and viscosity data, a K_m value for polystyrene of 0.45×10^4 is established for use in the viscosity-molecular weight equation:

$$M = \frac{\log \eta r}{C} \times K_m$$

This value is less than one-third that selected by Staudinger for polystyrene, ranging in molecular weight from 7,000 to 13,000 determined by the cryoscopic method.

Cryoscopic data at various concentrations are presented on narrow fractions of polystyrene ranging in molecular weight from about 300 to 3,000. From these data it is shown that solutions of polystyrene in benzene exhibit increasing deviation from Raoult's law as the molecular weight increases beyond about 1,000. This fact shows why the present K_m value, based only on ideal solutions, is so much lower than Staudinger's value, based on higher polymers whose solutions deviate widely from Raoult's law.

It is confirmed that the well-known Staudinger viscosity-molecular weight rule cannot be applied to different polymers. The Staudinger K_m equivalent based on the present authors' results is more than 300% higher than Staudinger's value.

A new K_m equivalent for one chain atom is calculated for various polymers, based on the number of chain atoms in the base molecule, the K_m value, and the weight proportion of chain atoms to the base molecular weight. A wide variety of linear polymers give K_m equivalents, ranging from 2.2×10^4 to 4.8×10^4, depending on influences of solvent, side groups, etc. A. R. Kemp and H. Peters.

Cryoscopic and Viscosity Studies of Polyisobutylene. Cryoscopic Deviation of Polyisobutylene Solutions from Raoult's Law. Cryoscopic and viscosity measurements on low polymeric isobutylene have led to an accurate determination of the K_m constant to be used in the viscosity-molecular weight equation

$$M = \frac{\log \eta_r \times K_m}{C}.$$

A K_m value of 0.75×10^4 was found in contrast with values of 1.4×10^4 obtained by Staudinger. Data are presented showing that K_m increases from 0.60×10^4 for a trimer to a constant value of 0.75×10^4 as the molecular weight approaches 1,000.

It is shown that cryoscopic deviation from Raoult's law begins when the molecular weight of polyisobutylene exceeds about 2,300, corresponding to a chain of about 80 carbon atoms.

Solvent effects were investigated, and the viscosity of benzene solutions of polyisobutylene are shown to act anomalously; whereas solutions in *n*-hexane and certain other solvents behave in a regular fashion.

It is shown that a combination of diffusion and precipitation procedures is effective in fractionating mixed isobutylene polymers. A. R. Kemp and H. Peters.

New York Group Hears Miscall and Cramer

THE New York Group, Rubber Division, A. C. S., met May 15 in the clubrooms of the Building Trades Employers' Association, 2 Park Ave., New York, N. Y. About 200 members and guests were present.

At the technical session J. Miscall, of Flintkote Co., spoke on "The Place of Rubber Dispersions in the War Effort." After discussing dispersion mixtures of crude, reclaim, and synthetic rubber, he pointed out the physical limitations of the films of dispersions and their uses as limited by tensile strength. A list of products made from dispersions was given, including many goods formerly made of latex. In conclusion Dr. Miscall said that dispersions are not at present available on the general market; their production is limited entirely to war uses.

H. I. Cramer, Sharples Chemicals, Inc., gave an illustrated lecture, "Synthetic Rubber Review", which traced the development of the various types of synthetic rubbers in Europe and the United States, and described their chemical structure, physical properties, processing and plasticizing properties, and commercial synthesis. Future production and price estimates of several varieties were given.

After dinner the door prizes were distributed. They were a fluorescent lamp, drill set, wrist watch, radio, and lawnmower. A floor show consisting of novel acts by various radio and night club entertainers concluded the meeting.

Akron Summer Outing

THE Akron Group, Rubber Division, A. C. S., will hold the annual summer outing at Fairlawn Country Club, Akron, O., June 19. Invitations have been extended to other Rubber Groups, and more than 500 guests are expected at the all-day outdoor meeting devoted to sports and games. Prize awards will be made in the evening after dinner.

L. A. Group Membership Grows

THE Los Angeles Group, Rubber Division, A. C. S., meeting May 5 at the Mayfair Hotel, Los Angeles, Calif., was attended by 126 members and guests. Nineteen new members were presented with Group yearbooks.

Following dinner, Edwin T. Hubble, of the Mt. Wilson Observatory, presented a slide illustrated talk which described the astronomical findings of the large telescope at the observatory. A sound film in color, "Modern Control of Quality in the Manufacture of Glassware", presented by J. R. Roland of the Owens Illinois Pacific Coast Co., was followed by a discussion of recent developments of "Fibre Glass" by Edward Titus, of the Corning Fibre Products Division. This insulation material is used as a substitute for cork and asbestos in the war program.

Door prizes consisting of war stamps were won by Phillip Drew ($10), of Goodyear Tire & Rubber Co.; G. L. Walther ($5), of the J. R. Gardner Co.; and R. B. Grimes ($3.75), of the Dill Mfg. Co. Special prizes were a $25 war bond donated by H. F. Parkerton, of Farrel-Birmingham Co., Inc., won by H. B. Libkind, of the Western Insulated Wire Co.; and a pair of fog lights given by Harry Franklin, of the Arrowhead Rubber Co., and won by L. F.

MacDonald, of the California Shipbuilding Co. Table favors were donated by Irwin M. and Jerome H. Desser, of the Desser Tire & Rubber Co. Plastic golf tees were given all present through the courtesy of Robert D. Abbott, of the C. P. Hall Co., representing General Atlas Carbon Co., and photographs of General MacArthur were presented to members by E. M. Royal, of H. M. Royal Co.

Chicago Group Elects Officers

THE Chicago Group, Rubber Division, A. C. S., convened May 1 for a dinner meeting at the Congress Hotel, Chicago, Ill. The following officers were elected: chairman, Calvin Yoran (Featheredge Rubber); vice chairman, E. Meyer (Herron & Meyer); secretary-treasurer, Bruce W. Hubbard (Ideal Roller); executive committee, H. Boxser (Acadia Synthetic Products), E. Horan, R. G. Penner (W. H. Salisbury & Co.), U. H. Harmon (Dryden Rubber), H. A. Winkelmann (Dryden), B. W. Lewis (Wishnick Tumpeer), W. N. Crumpler, G. Maassen, and C. M. Baldwin (United Carbon).

As a feature of the technical session, R. L. Sibley, Monsanto Chemical Co., spoke on "Chemical Reactions of Rubber." His paper appears in this issue. (See page 244.)

Yale Defense Course Given by Rubber Technologists

A COURSE in rubber technology, under the Engineering, Science and Management Defense Training Program, a part of the National Defense Training Program, has been organized at the Engineering School of Yale University, New Haven, Conn. The class, a lecture and discussion group concerned with the immediate problems of natural, reclaimed, and synthetic rubber, meets one night a week. About 110 men, the majority of whom are graduate engineers and departmental heads in the rubber industry, are enrolled for the 20 sessions, which conclude June 25.

Two introductory talks, a third on the chemistry of rubber, and a fourth on natural and synthetic latex have been given by Ernst A. Hauser, of the Massachusetts Institute of Technology. Other subjects have included the physics of rubber by R. H. Gerke, of United States Rubber Co.; rubber compounding by A. A. Somerville, of R. T. Vanderbilt Co., Inc.; reclaimed rubber by Paul Elliott, of Naugatuck Chemical Division of U. S. Rubber; rubber equipment by F. H. Banbury, of Farrel-Birmingham Co., Inc.; the problem of the natural rubber supply of South America by William O'Brien, of Seamless Rubber Co., Inc.; mechanism of polymerization processes, and properties of polymers by Hermann Mark, of Polytechnic Institute of Brooklyn.

Other discussions in the series will cover rubber dispersions, and various synthetics including "Thiokol", Hycar, neoprene, Ameripol, and buna types.

Holt and Carpenter Address Gathering of Canadian and American Chemists

THE second annual international meeting of the members of the Buffalo Group, Division of Rubber Chemistry, A. C. S., and the Ontario Rubber Section of the Canadian Chemical Association was held April 30 at the General Brock Hotel, Niagara Falls, Canada. For the first time the Quebec Rubber & Plastics Group participated in the general meeting, and the result was a very impressive gathering with over 200 in attendance at the dinner meeting.

The principal speakers were E. G. Holt, rubber expert and industrial consultant to the rubber industry, Division of Industrial Economy, United States Department of Commerce, and Arthur W. Carpenter, head of the testing laboratories of The B. F. Goodrich Co., now serving in Washington as a rubber specialist with the Bureau of Industrial Conservation of the War Production Board. John S. Plumb, of U. S. Rubber Reclaiming Co., chairman of the Buffalo Group, presided at the meeting and introduced the speakers and guests, who included John S. Street, chairman, J. T. Blake, vice chairman, and H. I. Cramer, secretary, respectively, of the Division of Rubber Chemistry.

Norman S. Grace, of Dunlop Tire & Rubber Goods Co., Ltd., chairman of the Ontario Section, then took over the program and introduced W. R. Walton, Jr., works manager of Dunlop and chairman of the Canadian Rubber Conservation Commission, who, after a brief talk, presented Mr. Carpenter as the second speaker of the evening.

Mr. Holt talked on "The Trend of the Rubber Industry" and gave a most informative address on the subject with which he is so well acquainted. He stressed the seriousness of the rubber situation and the fact that it was not generally recognized, not only by the public and the layman, but by many members of the rubber industry itself. Few people, for instance, he said, realized the effect of the rubber shortage on the economic life of the country at large in curtailing various necessary and unnecessary activities depending on automobiles and decreasing large revenues derived from car licenses and gas taxes. Mr. Holt emphasized the importance of developing new sources for supplying crude rubber, but held little hope for any substantial quantities from South America for a long period owing to production difficulties and the fact that at present South America is consuming more rubber than it produces. He spoke strongly in favor of greater efforts and speed in the production of guayule and was of the opinion that with the development of large plantations and increased production the cost of that type of rubber could be reduced materially.

In the Far East, he said, the Japanese had secured control of major rubber producing areas and had available much more crude than that the nation could consume, which meant a good chance of the excess rubber being offered to other countries such as Russia, the South American republics, and even China. However, even though the trees were not destroyed by the Japanese and reverted again to the control of the British or the Dutch, it would probably require some years to put them into condition for full production.

Emphasizing the importance of reclaimed rubber in the war effort, Mr. Holt said that plants should be operated to capacity, and earnest steps made to gather together the great amount of scrap rubber scattered about the country. In fact it was intimated that the government had in mind a plan to speed up scrap collection on a national basis.

In discussing synthetics and the task that lies ahead in producing the great quantity, 800,000 tons annually, spoken of in Washington, the speaker urged that rubber manufacturers and their technical staffs experiment widely in the handling of synthetics and exchange information freely for the national good. Whereas average compounds formerly consisted of 75 parts of crude, 24 parts of reclaim, and one part of synthetic, future compounds may require as much as 65 parts of synthetic, 25 of reclaim, and only 10 of crude. It behooves the rubber chemists, therefore, to revamp compounding practice to meet the new conditions.

In his talk on "Rubber and the War", Mr. Carpenter outlined the functions of the various agencies in Washington having to do in one way or another with rubber and particularly his own division, the Bureau of Industrial Conservation. He cited the efforts of the Bureau to cooperate with the rubber industry to best advantage and cited cases in which specifications offered by manufacturers to meet the new situation were revamped on a broader basis by the Bureau to insure a better product. He defined the status of "War Orders" and those classed as for ordinary defense or civilian needs and declared a sincere effort was being made to provide for essential civilian requirements.

The latex situation is serious, declared Mr. Carpenter, and supplies must be conserved because it will be some years before further substantial supplies are available. To meet the existing situation he urged the more general use of dispersions. As to the reclaim situation, he agreed with Mr. Holt that there was a large quantity of scrap scattered about the country, but the problem was one of collection, and steps are being taken to meet that problem. He said the tendency was to utilize the present reclaiming equipment to capacity rather than expand facilities. It was probable, too, that supplies of scrap would be allocated, and stocks being held back would be requisitioned.

In closing, Mr. Carpenter suggested that other products such as cork, leather, fabrics, plastics, etc., be substituted for rubber wherever possible, and he also cited several examples of substitutions that have proved successful.

Following Mr. Carpenter's address, Mr. Street stated that an interesting program was already being arranged for the meeting of the Division of Rubber Chemistry, A. C. S., to be held in Buffalo in September at the time of the one-hundred-and-fourth meeting to be held by the American Chemical Society.

Summer Conferences at Gibson Island

TEN research conferences in chemistry and allied fields will be held at the fifth annual summer session at Gibson Island, Md., sponsored by the American Association for the Advancement of Science. The conferences are scheduled for the weeks of June 15 through August 24 excluding the week of August 10. Registration fees, reservations, and requests for information should be addressed to the director, Neil E. Gordon, Central College, Fayette, Mo.

The conference on Organic High Molecular Weight Compounds, of which S. S. Kistler is chairman and H. Mark, vice chairman, begins July 6. The program follows: July 6, "Nature, Direction, and Magnitude of Forces between Molecules", J. C. Slater, and "Interfacial Force Phenomena", Irving Langmuir; July 7, "Experimental Aspects of Adhesion to Metals", G. H. Young, and "Structural Aspects of Adhesion and Cohesion", Otto Beeck; July 8, "Structural Aspects of Adhesion and Cohesion", H. Mark, and "Distribution of Molecular Sizes in Organic Polymers", J. G. McNally; July 9, "Condensation Polymerization", P. J. Flory; and July 10, "Theory of Vinyl Type Polymerization", F. K. Schoenfeld.

Among the papers scheduled for the petroleum chemistry conference are: "Intramolecular Forces; Structure of Hydrocarbon Molecules", Henry Eyring, June 15; "Fundamental Principles of Catalysis", R. E. Burk, June 17; and "Oxidation of High Molecular Weight Carbons", A. L. Lyman, June 18. The meeting of the textile fibers section will include "Crepe Phenomena in Fibers and Other High Polymeric Substances" by Herbert Leaderman, and "Molecular Interpretations of Some Mechanical Properties of Fibers", Lyman E. Fourt, July 13; "Fatigue of Fabrics", W. F. Busse, July 14, and "Role of Anionic and Cationic Agents in Textile Processing", Harvey A. Neville, July 16. At the conference on corrosion H. A. Nelson is scheduled to speak on "Testing and Evaluation of Organic Coatings", on August 6. Other conferences will deal with catalysis, vitamins, instrumentation, chemical growth promotors, X-ray and electron diffraction, as well as the relation of structure to physiological action.

Rubber Research at Mellon Institute

RESEARCH in rubber technology is being aided by the employment of additional personnel to the fellowship of the Firestone Tire & Rubber Co., Akron, O., at the Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Pa., because of the critical importance of rubber in the present national emergency. Fundamental studies of industry problems have been under investigation by this fellowship for the past four years. The "Twenty-ninth Annual Report of the Mellon Institute" lists 95 fellowships in operation in 1941-42, including research in calcite technology, carbon black, naphthalene chemistry, protective coatings, sulphur, and surgical supplies. Many studies concern war and post-war problems.

The behavior of Micrite, a finely pulverized calcite, as a filler in rubber compounds, and of Gartex, a filler for hard rubber compounds, is under study. A new series of rubber accelerators in the thiocyanates group has been discovered. Complete processing details for a strong cotton tire cord of long flex-life and low susceptibility to heat and moisture for use in heavy-duty pneumatics, developed over the past three years, was released to industry. Research in waste disposal from by-product coking has disclosed the presence of a relatively large proportion of cyclopentadiene in the low-boiling compounds obtained in the distillation of light oil. Cyclopentadiene is recognized as a potential co-polymer in the synthesis of synthetic rubber. Commercial production of Raolin, a chlorinated rubber recently developed by an Institute fellowship, is under WPB allocation.

Accelerators for Latex and Reclaim

ARAZATE (sp. gr. 1.28), Butazate (sp. gr. 1.24), Ethazate (sp. gr. 1.38), Methazate (sp. gr. 2.00), and Pipazate (sp. gr. 135), products of the Naugatuck Chemical Division, United States Rubber Co., 1230 Sixth Ave., New York, N. Y., are ultra-accelerators of the zinc dithiocarbamate type. These white or light colored powders are insoluble in water and melt with decomposition at fairly high temperatures. They are decomposed by strong acids and alkalis. All are reportedly useful for fast low-temperature cures of dry rubber compounds, but their activity in the low-temperature range results in a tendency to cause scorching in such compounds.

Arazate cures rapidly in dried or coagulated rubber latex compounds, but is slow to pre-cure in ammonia latex. It is said to produce a more stable and uniform water paste than does Naugatex 275, which, in general, has similar properties. Arazate may be used alone or in combination with other accelerators in latex products to be cured at from 180 to 250° F. Butazate is sometimes used in low-temperature cures of rubber cements and tank lining compounds. Methazate is principally employed in the continuous vulcanization process of wire insulation. Pipazate, the zinc salt corresponding to Naugatex 144, is widely utilized in paste form for latex products cured at moderately low temperatures. These accelerators are also available in 40% water dispersions.

Morfex #33 (sp. gr. 1.48), and Morfex #55 (sp. gr. 1.46), are semi-ultra Naugatuck accelerators effective in low-sulphur reclaim stocks and at all temperatures. These thiazole-thiuram mixtures are reportedly useful in insulated wire and mechanicals compounding. Both are said to be totally non-discoloring and are not retarded by common fillers and pigments. They are activated by litharge, aldehyde amines, and guanidines. Of long-curing range and good cure-burn ratio, each is reported to have medium modulus, and excellent aging and dispersion qualities. Morfex #55 contains a larger proportion of thiuram to thiazole than does Morfex #33 and therefore provides more positive cures, especially with low-sulphur compounds. It is said to effect a good firm cure when used on the basis of 1% on the rubber content with 2% of sulphur.

Quebec Group Affiliates with S. C. I.

THE Quebec Rubber & Plastics Group held the final meeting of the current season May 8 at the Ritz Carleton Hotel, Montreal, P. Q., Canada. After dinner the following officers for next season were elected: chairman, Peter Gunter (Mack Moulding); vice chairman, A. B. Lewis (British Rubber); secretary-treasurer, R. V. V. Nicholls (McGill University); executive committee, J. T. Dunn (Dominion Rubber), J. H. McCready (Hale Bros.), N. C. Smith (Dominion Rubber), H. L. Blachford (H. L. Blachford Co.), L. C. McLeod (Monsanto), and W. P. B. Gedye (Miner Rubber).

The scheduled lecture on plastics by A. E. Byrne, of the Canadian General Electric Co., was cancelled because of the speaker's inability to appear. The evening program was featured by an illustrated talk on "Special Applications of Electricity for Heating in Industry" by R. N. Fournier, industrial heating engineer, Canadian General Electric. Mr. Fournier described in detail the practical applications of infra-red rays in vulcanizing thin rubber sheets and in drying paints and varnishes.

The Quebec Group has affiliated with the Montreal section of the Society of Chemical Industry, and next year the combined groups will be known as The Rubber & Plastics Division of the Society of Chemical Industry. Necessary changes in the constitution have been approved by the parent society.

Society of Chemical Industry, American Section, announces election of the following officers: Foster Dee Snell, chairman; Norman A. Shepard, vice chairman, and J. W. H. Randall, honorary secretary. The new executive committee members are Lincoln T. Work, Edward R. Allen, Francis J. Curtis, Donald Price, and Archie J. Weith.

Tackifier for Synthetic Rubbers

P. H. O., a product of the Neville Co., Pittsburgh, Pa., is a modified coumarone-indene di-polymer oil. It is, reportedly, a suitable tackifier for Hycar OR and Perbunan compounds.

IMPORTANT
for Natural Rubber

All **IMPORTANT**
for Synthetic Rubber

MICRONEX
Beads or Compressed

A COLUMBIAN COLLOID

200 TONS OF SMOKE A DAY

BINNEY & SMITH CO. • **COLUMBIAN CARBON CO.**

DISTRIBUTOR — MANUFACTURER

COLUMBIAN CARBON COMPANY

The ALL Importance of

MICRONEX

In Synthetic Rubber

WHEN Micronex is added to natural rubber the tensile, modulus and abrasion resistance are increased by amounts from thirty to over a hundred per cent.

These increments represent important improvements in specific properties of a material which itself exhibits great resilience and energy. Tensiles of 3000 pounds or more can be developed in natural pure gum rubber.

With Buna S, Micronex plays an all important role. Here the vulcanized basic material lacks tensile strength and elasticity. It is only when reinforced to a very considerable degree by a material of colloidal dimensions that it can act as a replacement for natural rubber. Tensile is advanced by 300 per cent.

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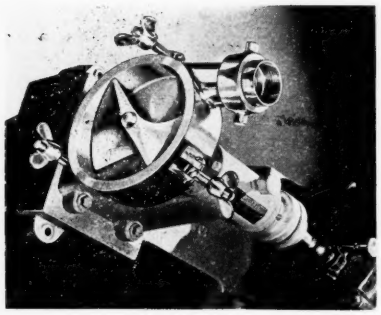
New Machines and Appliances



Tri-Clover Centrifugal Pump

Centrifugal Pump Handles Latex

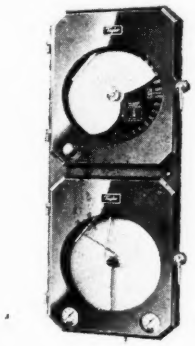
THE Tri-Clover centrifugal pump, originally designed to handle foods and chemicals with a minimum of agitation, is reportedly useful for pumping latex and dispersions of synthetic rubber. In factory tests extended latex of 30% concentration at temperatures from 70° to 100° F. was pumped from a 1200-gallon tank in 12 minutes. A gear pump of slightly less capacity rating required 1¾ hours. The maximum head was about 20 feet. The action of the centrifugal pump is said to be such as to eliminate: whipping of the product, coagulation of the latex, and breaking up of the globules. Easily cleaned by flushing with water, the pump is made in several sizes. Tri-Clover Machine Co.

Votator Transfers Heat at Rapid Rate

THE Votator is a continuous closed mechanism for heating, cooling, and mixing liquids and viscous materials in which refrigerants or steam can be used for the heat transfer medium. The metal jacket surrounding the medium is heavily insulated, and the heat transfer tube assembly is protected by a substantial metal cover. The materials being processed do not come in contact with the atmosphere, but predetermined amounts of gas may be introduced into products. Revolving scraper blades remove the film from the thin wall that separates the product from the heat transfer medium and permit a continuous exposing of the heat transfer surface to the incoming material. The scraping and mixing action of the blades also assures uniform temperature change in the product as it passes through the annular space between the mutator shaft and the heat transfer tube.

The high ratio of heat transfer surface to volume of material is said to result in a high rate of heat transfer and to permit a wide-range change in temperature of the product, usually in a few seconds. The rapid heat transfer will, reportedly, allow super-cooling of many products below the crystallization point and discharge in a liquid state. The process makes possible a high K value, uniform temperature throughout the material, and accurate temperature control. The unit can be used to make a uniform mixture or to emulsify a mixture of products while the temperature is being changed.

The mechanism is so constructed that it can be incorporated into various flow systems. Multiple assemblies may be used for both heating and cooling the product in a few seconds. It is produced in standard sizes and designs to fill the requirements of many processes. Girdler Corp.



Fulscope Time Schedule Controller

Automatic Timing Mechanism for Process Repetition

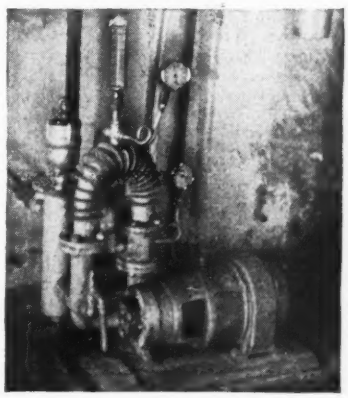
A TIME schedule controller for Fulscope recording controllers is reported to maintain exact temperature, pressure, flow, or liquid level according to a predetermined time schedule. After the processing time has been determined, this instrument makes it possible to repeat an operation automatically and precisely as many times as is desirable. It is said to be adaptable for such rubber processes as dry heat and steam cures for vertical or horizontal vulcanizers. Other improved features of the time schedule controller include a friction drive cam assembly which permits rotation of the cam without loosening any locking means; a method of resetting one cam without disturbing the other in an instrument with two complete control mechanisms; and automatic return of the cam to the starting position. Each cam is capable of automatically operating from one to four air valves, microswitches or both for the regulation of such external mechanisms as bell, lights, or valves in any desired relation of one to the other.

An optional feature, the Interrupter Timer, built within the controller, permits extreme flexibility to the rise and holding periods of the process under control. The speed of a very fast cam clock, used for a rising period, is reduced to increase the length of the holding period. Both periods may be increased as much as 6½ times the normal. The time schedule controller is available in all control forms, including automatic reset and Pre-Act. Taylor Instrument Cos., Rochester, N. Y.

Closed Circuit Condensate Return System

AN ESSENTIAL feature of a high-pressure condensate return system is a centrifugal pump which draws water from a thermo-fin priming loop and discharges it as a high velocity jet through a pump nozzle. The jet, striking the returned hot condensate, induces its flow through a mixing tube into the loop. The volume of the condensate in the constantly filled loop results in the discharge of an equal volume through the air separator to the boiler. After expulsion of the air from the closed circuit, the condensate is returned to the boilers. The closed circuit from the boiler, through the process equipment, and back to the boiler is said to assure maintenance of a uniform high temperature, eliminate flash loss, and provide a 1% fuel saving for each 11° F. temperature gain.

At one rubber company making gaskets, washers, and miscellaneous mechanical goods this system supplies steam to the molding presses at from 120 to 125 pounds per square inch, and evacuates the presses at 85 pounds per square inch. The condensate is returned to the boiler at a temperature of about 325° F. The five-pound compressor exhaust is completely utilized in heating makeup. Increased production, fewer rejects, more accurate timing of the cure, and an estimated 28% fuel saving are claimed to be direct results of the installation of this system. Cochrane Corp.



High-Pressure Condensate Return System

New Goods and Specialties

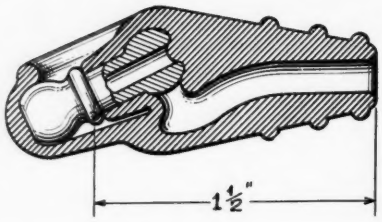
Flexible Fibronized Tubing

Rubber-like Insulating Tubing

"TRANSFLEX" is a tough, transparent tubing with rubber-like qualities, reported to have efficient resistance to brittleness down to —50° C. The tensile strength is 3,000 pounds per square inch, and the dielectric strength (tubing with wall thickness of about 0.020-inch) is 850 VPM, dry, and 815 VPM, wet. The water absorption is 0.4% in weight after immersion for 24 hours. Subjected to the Wemco Oil Test, "Transflex" is not attacked after 48 hours at 100° C. The allowable continuous operating temperature is 66° C. Developed to secure effective insulation in aircraft at high altitudes, other industrial and electrical applications are indicated by its properties. Quick location of wire breaks and identification of wires is afforded by the transparency of the tubing. Irvington Varnish & Insulator Co.

Reclaimed Rubber Closure Valve

"TIPIPE" Valve Shut-off,[1] developed for the control of air or liquids in fountain syringes, sterilization bags, cushions, life preservers, and similar articles, is reportedly fast-inflating and non-corrosive. The moving parts of the valve, a flexible walled chamber, are entirely contained within the valve structure. The valve may be set by a bending pressure in either an open or closed position and will remain in that position until sufficient bending pressure is applied to overcome the holding tension of the valve structure. On a fountain syringe it acts as a socket for the pipe, replaces the conventional metal shut-off valve, and will remain in the open or shut position by tipping the pipe. The valve is manufactured from reclaimed rubber.



"Tipipe" Valve for Life Preserver in Closed Position

[1] U. S. patent No. 2,279,834. Granted Apr. 14, 1942, to Howard H. McGee, New York, N. Y.

Telephone Holding Device

HOLD-THE-PHONE is a rubber device, designed to fit any cradle-type telephone, that permits freedom of both hands during conversations. The holding piece is placed permanently on the phone a little less than half way from the receiving end, and in use hooked over the shoulder. The best results are said to be obtained when the user is sitting in an upright position or bent slightly forward. Horder's, Inc.

Hold-the-Phone Frees Both Hands

High-Speed Belt

THE endless, lightweight Gilmer-Hevaloid Belt for high-speed precision work is made without lap, seam, or splice. By impregnating the cotton pulling element with latex, a homogeneous material is said to be formed to give elasticity, strength, and durability. The belt is reported to operate without vibration. A non-slip surface affords a high coefficient of friction and produces a positive drive which is reported to permit lighter tension and decreased bearing load and to maintain a higher and more uniform driven speed on drives for such applications as routing machines, winders, and grinders. It is adapted for speeds up to approximately 9,000 feet per minute. L. H. Gilmer Co.

Blackout Hose of Reclaimed Rubber Painted with White Sidewall Tire Paint at Nozzle and Coupling Ends. Goodyear Tire & Rubber Co.

Oilproof gaskets, washers, diaphragms, and other articles with high tensile strength and abrasion resistance molded from compounded sheets of Resistoflex PVA and also said to be impervious to organic solvents of all kinds. Some are made from sheets with fabric or metal inserts or backing. Resistoflex Corp.

UNITED STATES

Synthetic Rubber from Alcohol Advocated; New Butene Process Announced; Move Maximum Prices

The WPB has released a program for the production of synthetic rubber using farm products to secure grain alcohol as a source of butadiene (see story below).

Standard Oil has announced a new process to increase output of butene for synthetic rubber. (See page 267.)

A joint statement was issued last month by four defense heads on the rubber situation. (See page 267.)

Agreements have been signed with Latin American countries regarding the sale of rubber. (See page 266.)

RFC is underwriting purchase also of excess tires and tubes held by consumers. (See page 267.)

An executive order (see page 270) further defined the functions and duties of the ODT to embrace all rubber-borne transportation facilities.

Amendment No. 9 to Supplementary Order No. M-15-b (see pages 252, 271) continued to limit during May use of scrap and reclaimed rubber in a specific list of articles to 60% of a formula based on an average monthly use over a base period. In a further move to conserve rubber the WPB set specifications for feeding nipples in Amendment No. 5 to Supplementary Order No. M-15-b-1 (see pages 252, 271) and also extended indefinitely, by Amendment No. 2 (see pages 252, 271), Conservation Order No. M-124, freezing stocks of rubber yarns and elastic thread.

The OPA has set maximum prices on a variety of rubber goods including rubber footwear, mechanicals, and certain tires. (See page 268.)

Late last month, as we were going to press, President Roosevelt stated at a press conference that a tire might be developed other than of natural rubber, but he gave no details. Rubber Coordinator Newhall also indicated such a possibility, but declared that nothing definite was "in sight yet." At the same time the Truman Committee in a report to the Senate forecast that a three-year rubber ban might face civilians; stated dependence was mainly on the synthetic rubber program, actual output of which was still in doubt; cited the lack of a scrap collection program; cautioned the Army on careless use of tires; and placed the blame for the present precarious rubber situation on American officials and agencies, the automobile industry, and British and Dutch interests formerly controlling world rubber supplies.

WPB Announces Grain Alcohol Program for Rubber Production

As a result of farm bloc interests, Congressional investigation, studies by government war agencies, and need of increased amounts of rubber to further the war effort, recent developments have expanded the synthetic program to include the utilization of farm products for grain alcohol as a source of butadiene.

Claude R. Wickard, Secretary of the Department of Agriculture, in a statement before the subcommittee of the Senate Committee on Agriculture and Forestry Investigating Uses of Farm Crops in Production of Alcohol and Synthetic Rubber (the Gillette Committee), said May 8, that much progress was being made in exploring various phases of the manufacture of rubber substitutes from corn, wheat, and other surplus farm crops. Most of the Department's work on synthetic rubber has been done in the regional research laboratory at Peoria, Ill.

He said, in part, "I believe that use of part of our reserve stocks of corn and wheat as material for butadiene offers the best possibility of greatly increasing our production of synthetic rubber as early as next year. Large stocks of corn and wheat are available."

Mr. Wickard's statement also pointed out that the process of converting 95% alcohol to butadiene was technically established. He stated that considerable expansion of facilities for making alcohol out of grain is possible in existing distilling plants with the use of relatively small amounts of copper and steel and indicated that if such plants were converted to high-proof production, 200,000,000 gallons of alcohol for making butadiene could be produced after allowing for production of alcohol for other war purposes. The 80,000,000 bushels of wheat or corn required would produce 222,000 tons of butadiene for conversion to approximately 240,000 tons of buna-type synthetic rubber. Supplies of wheat and corn are sufficient for expanding synthetic production by many times that amount.

Standard Offers Alcohol-Butadiene Process

On the same day W. S. Farish, president of the Standard Oil Co. of New Jersey, writing Mr. Wickard, offered royalty free, for the war's duration, the company's processes for making butadiene from grain alcohol through an aldehyde-aldol-butylene glycol synthesis. Mr. Farish's letter stated that Jersey's technologists were confident of the soundness of the process which would produce an estimated 2.2 pounds of butadiene per gallon of alcohol.

Surveys Reveal Production Cost

Harold E. Thompson, vice president of the Carbide & Carbon Chemicals Corp., testifying before the Commitee said the company will have ready early in 1943 an 80,000-ton capacity alcohol butadiene plant, construction of which was begun March 1, 1942. The company has a contract with the Rubber Reserve Co. to produce 80,000 tons of butadiene a year which will require 72,000,000 gallons of alcohol. Mr. Thompson told the Committee that the cost of butadiene by this process has been estimated at 12.61c per pound, but he believed a lower figure possible. Royalties to the company will be 7/8c per pound, or $200,000 for 80,000 tons.

The company's process, which is reported advanced beyond the pilot-plant stage and fully engineered, is a one-step process, in which alcohol for butadiene is obtained either from natural or refined gas. The Committee seeking to establish that the one-step process of alcohol for butadiene is quicker and less expensive than the multi-step process used in making butadiene from petroleum brought out that an alcohol plant uses a 180-pound compressor while the petroleum process calls for a 400-pound compressor. It was mentioned in the hearings that 140 tons of steel are required for each 1,000 tons of petroleum butadiene capacity. It was further contended by the Committee that additional alcohol can be obtained by reopening many closed distilleries.

Arthur B. Newhall, Rubber Coordinator, advised Donald M. Nelson, WPB chairman, that an emergency supply of butadiene for synthetic rubber production was desirable and that it might be found that the easiest and quickest method of getting such a supply would be to increase substantially the present Carbide & Carbon program. But in testimony, May 12, Mr. Newhall told the Committee that he understood 300 miles

CALENDAR

June 1-2.	Canadian Chemical Association. Convention. Hamilton, Ont.
June 8-11.	A.S.M.E. Semi-Annual Meeting. Cleveland, O.
June 18-20.	Colloid Symposium. National Research Council and Division of Colloid Chemistry, A. C. S. Boulder, Colo.
June 19.	Akron Rubber Group. Annual Outing. Fairlawn Country Club, Akron, O.
June 22-26.	A.S.T.M. Chalfonte - Haddon Hall, Atlantic City, N. J.
Oct. 5-9.	N.S.C. Thirty-first National Safety Congress. Stevens Hotel, Chicago, Ill.
Oct. 12-14.	A.S.M.E. Fall Meeting. Rochester, N. Y.

of copper tubing alone would be needed to build grain alcohol plants with a capacity of making 82,000 tons of butadiene per year.

It was reported May 20 that Mr. Nelson had ordered surveys on the feasibility of mass production of synthetic rubber from grain alcohol. WPB sources indicated that the alcohol processes appear to be simpler and quicker, but no large-scale experiments have been made. The surveys are also expected to reveal whether the alcohol process will require more copper and other scarce materials. The Chemicals Branch of the WPB is reportedly opposed to the alcohol-butadiene program on the grounds that it would require large tonnages of strategic materials and that butadiene is more cheaply produced from petroleum products.

The following comparison of strategic metals for alcohol butadiene and petroleum butadiene per 1,000 tons of butadiene was presented to the Committee:

	For Alcohol Process Tons	For Petroleum Process Tons
Copper	50.60	9.00
Nickel	1.00	2.05
Chrome metal	2.20	5.00
Steel plates	140.00	165 to 194

Polish Process Studied

Waclaw Szukiewicz, Polish refugee scientist, has given to the WPB another one-step process of making butadiene from alcohol which he claims requires no steel plate for production. The estimated cost is about $85,000,000 for the first 400,000 tons, compared with RFC figures of $400,000,000 for the first 400,000 tons of synthetic rubber plant capacity. The process would require 525,000,000 gallons of alcohol for each 700,000 tons of production. This process, which is reported to require large quantities of copper coils, is being studied, and, if found satisfactory, will be measured against equipment requirements.

Sulphite Liquor Process Offered

Joseph L. McCarthy, University of Washington professor, in a letter made public by the Committee, declared that the production of ethyl alcohol for synthetic rubber from waste sulphite liquor was a practical method that could be placed in production in from six to 12 months with allocation of relatively small amounts of priority metals. Executives of the Bonneville Power Administration are said to be preparing a proposal for submission to the WPB for a 40,000-ton production of Buna-S, using butadiene from waste sulphite of pulp mills, styrene from benzene, and ethylene by-products of Portland, Oreg., and Seattle, Wash., gas plants. Professor McCarthy estimated the cost of an annual production of 50,000 tons of ethyl alcohol per year by this method would require an investment of about $14,250,000. The McCarthy figures and analysis were primarily prepared to aid in securing enactment of S.B. 2474 which provides that RFC may make loans for financing and construction of plants for the production of alcohol from grain crops and forest products.

Distillery Conversion Planned

In Senate debate May 19 Senator Guy W. Gillette (Iowa) declared that "it has been demonstrated to us that plants for the utilization of farm products can be established at one-tenth the cost of the critical materials, in one-third of the time, and that synthetic rubber and alcohol can be produced from that source on a competitive basis with any other type of process."

William J. Hale, president of the National Agrol Co., testified that synthetic rubber could be made from surplus farm commodities for 5c per pound. He further stated, "In spite of the fact that never in this world has there been manufactured more than 50,000 tons of butadiene (used in making synthetic rubber) from petroleum products, and yet some 500,000 tons has been made successfully from alcohol," it had been "decided that alcohol, unless it issued from petroleum, could not have any place in this picture. Grain alcohol was taboo."

Two days later it was disclosed in official quarters that total conversion of the distilling industry for greatly increased production of alcohol for the manufacturing of rubber and other war materials will be rapidly effected. Jesse Jones, Secretary of Commerce, stated that the increase in grain alcohol for war necessities would probably allow the raising of the synthetic rubber production program to 1,000,000 tons annually. About 50% of the distilling industry was converted to alcohol production under an OPM order in January. The WPB will now allocate necessary equipment and assume greater control over plants producing industrial alcohol from blackstrap molasses, many of which are idle, and other distilleries. A recent survey has shown surplus facilities for the production of 200,000,000 gallons of alcohol from which butadiene can be made. Therefore present plans call for conversion of the distilling industry rather than expansion to provide one of the intermediary products of synthetic rubber.

May 22, Mr. Newhall said that the maximum use of grain alcohol will be made in the synthetic rubber program, but pointed out that butadiene must be transported to a polymerization plant at a temperature of not more than –5° C., and that it might be necessary to erect polymerizing plants near butadiene sources because necessary special transportation facilities may not be available. He also stated that the recently announced Standard Oil Development Co. process for simultaneous production of butadiene and 100 octane gasoline had been under WPB study for some time and that this process can be handled in existing plants with little additional critical material.

800,000-Ton Synthetic Rubber Program

The War Production Board has authorized the Reconstruction Finance Corp., both of Washington, D. C., to provide facilities for an annual productive capacity of 700,000 tons of Buna S synthetic rubber to be in operation not later than the end of 1943, it was announced April 25 by WPB Chief Donald M. Nelson and Coordinator for Rubber Arthur B. Newhall. This figure represents an increase of 100,000 tons in the Buna S program previously authorized by the WPB, and is in addition to the planned capacity for Butyl synthetic rubber and neoprene, totaling 100,000 tons. The War Production Board said that the 700,000-ton Buna S program is to be given all the priority and allocation assistance needed to assure the production of not less than 350,000 tons during the calendar year of 1943.

All the synthetic rubber to be produced for many months must be reserved for military uses, and none will be available for civilian uses, such as automobile tires.

Peruvian and Nicaraguan Rubber Made Available

Jesse Jones, Secretary of Commerce, announced, April 23, conclusion of arrangements between the Rubber Reserve Co. and the Peruvian Government for a $1,125,000 fund to be used by the Peruvian Amazon Corp., owned and operated by the Government of Peru, for increasing wild rubber production. All rubber, except that needed by Peru for essential uses, will be bought by the Rubber Reserve Co. for the next five years. Discussions had already been completed between the two governments leading to the establishment of an agricultural experiment station in Tingo Maria.

Agreements were signed May 4 between the Rubber Reserve Co. and the Republic of Nicaragua for the American purchase of all exportable rubber produced in Nicaragua through December 31, 1941. The United States Department of Agriculture had previously arranged to assist the Nicaraguan Government in the establishment of a demonstration station to stimulate development of rubber and other agricultural products.

José Maria Zelaya, Minister of Agriculture, later stated that the station would be located on the Atlantic Coast, possibly near Bluefields. The National Bank of Nicaragua, designated as sole buyer of rubber in that country for export to the United States, will pay at least 20¢ a pound for raw rubber and plans to send buyers to the producing areas, according to current reports.

New Process Increases Butene Output for Synthetic Rubber

W. S. Farish, president of the Standard Oil Co. of New Jersey, 30 Rockefeller Plaza, New York, N. Y., announced May 21 a method pioneered by the Standard Oil Development Co. for obtaining increased amounts of a synthetic rubber raw material and an improved quality of 100-octane aviation fuel simultaneously. It is estimated by Standard that adoption of the process will speed production of synthetic rubber from plants already under way and will provide a potential capacity of raw materials for more than 400,000 tons of Buna S and 240,000 tons of butyl rubber annually. Comparatively small amounts of critical building materials will be required, it is claimed, to place the improved method in operation. The first full-scale plant using the process is expected to be ready for production in September with a peak capacity of 17,000 tons a year. Thirty other refineries, planned or under construction, will be able to utilize the process, but it has not as yet been adapted for use by plants now operating.

Robert P. Russell, vice president of Standard Oil Development, stated that the process applies to the production of butenes derived from crude petroleum by fluid catalysis cracking units for conversion to butadiene. Old processes required large amounts of butene to make 100-octane gasoline, and an aviation gasoline refinery could produce only small quantities for butadiene. The new process permits about three times as much butene for the synthetic rubber ingredient, producing at the same time as much aviation fuel as under the previous process. If the new process is adopted in cracking units now in use and incorporated in those now being built, the construction of some units can be eliminated. If the increase in the synthetic rubber program to 1,000,000 tons yearly recently proposed by Jesse Jones, of the RFC, is approved, no appreciable increase in requirements for critical materials would be required to obtain the increased amount of butene from units already planned. Details have been supplied to the Petroleum Coordinator and other government agencies.

Defense Heads Issue Joint Statement on Rubber Supplies

To clarify the rubber shortage situation Donald M. Nelson, WPB chairman, Arthur B. Newhall, Rubber Coordinator, Leon Henderson, OPA administrator, and Joseph B. Eastman, ODT director, joined in a reiteration of salient facts designed to dampen recent optimistic reports about the availability of synthetic rubber and rubber scrap. The joint view indicated no rubber for any but the most essential uses this year and next. It also revealed that probably not more than 30,000 tons of synthetic rubber will be produced in 1942 and that only a miracle will raise the figure to 400,000 tons in 1943. A goal of 800,000 tons has been set by the WPB as the production rate to be reached at the end of 1943, of which 700,000 tons is to be the Buna S type, and the remainder neoprene and Butyl rubber.

Four polymerization plants now under construction will have a total capacity of 120,000 tons, but this capacity is said to exceed the total amount of butadiene available in 1942. To obtain an additional 200,000 tons synthetic capacity in 1943, it was stated, that it may be necessary to place oil refineries in butadiene production, find standby gas plants for additional production of styrene, and locate additional compressor capacity for alcohol production. The main bottleneck in synthetic rubber production is the lack of 300,000 horsepower of compressor capacity, it was said.

The Rubber Coordinator estimated 1942 reclaim production at 320,000 tons. He said that reclaim production in January was 30,000 tons, but that scrap collection was only 15,000 tons, and emphasized that the flow of scrap, greatly diminished since Pearl Harbor, must be started again to accelerate the war effort.

Surveying potential imports of crude, he warned that four to six years will be required to obtain an appreciable guayule production in the United States and that not more than 10,000 tons of guayule annually can be expected from Mexico. Brazil will supply from 10,000 to 15,000 tons of crude this year and possibly between 25,000 and 30,000 tons in 1943. The recent agreement with Peru is expected to provide from 6,000 to 10,000 tons over a five-year period.

Regarding tire control, Mr. Newhall said that it may be necessary at some future time to commandeer tires in one section of the country and ship them to another part to maintain transportation of essential war workers, but that present tire stocks should supply essential passenger transportation during the next two years. A census of tires immobilized in the possession of passenger car owners may be taken July 1 by WPB. Processes are being developed continually which are reducing the amount of crude which must be compounded with synthetic for tires, he declared, and revealed that recent captured German tires contain about 25% crude rubber.

RFC to Purchase Excess Tires from Consumers

Jesse Jones, Secretary of Commerce, announced May 12 that the Reconstruction Finance Corp., through its subsidiary, Defense Supplies Corp., both of Washington, D. C., would make available $150,000,000 to purchase new and used tires or tubes held by consumers. This plan is in addition to the one announced some time ago whereby DSC is financing to the extent of $75,000,000 the frozen stocks of new passenger tires and tubes which are in the hands of manufacturers, mass distributers, jobbers, and dealers.

The new tire program, the details of which are being worked out between the RFC and the OPA, will provide for acceptance of voluntary contributions from consumers; also payment in either war bonds or stamps, or cash in those instances in which the tires are sold to the government.

The program will be administered locally through the county tire ration boards of OPA and RFC loan agencies throughout the United States. Prices to be paid will be the appraised value as determined by the local board, but in no event will exceed the ceiling price. Insofar as practical, the tires donated and purchased in each locality will be stored there so that they may be subsequently made available at the lowest possible cost through the local board to the citizens in that vicinity entitled to tires.

On May 13 a telegram stating local rationing boards will not be asked to take in or resell tires under any plan by which the OPA offers to purchase consumers' excess supplies was sent to all OPA regional administrators by Paul M. O'Leary, deputy administrator in charge of rationing, who asked that the information be passed on immediately to state administrators and the local boards. Purpose of the message was to correct erroneous reports that have been published. It read:

"The Office of Price Administration is studying plans to offer to buy excess tires in consumers' hands, but the details are not completed as yet. Regardless of what mechanism is provided for the purchase of excess tires, the boards will not be requested to take in or resell tires as part of their function."

Local boards, however, probably would be called upon to ration any new tires and serviceable used tires that might be collected under the contemplated voluntary sale plan. This, however, would be no departure from their ordinary duties.

It is not known how long it will take for the OPA to set up a plan offering to buy tires, or possibly to receive them as a gift to the Government if the owner should refuse compensation.

To Finance Dealings in Rationed Commodities

Mr. Jones announced May 18 that the RFC, under the act (Public Law 549) given presidential approval May 11, will buy from, or make loans to, dealers in articles or commodities rationed by federal agencies. The loans or purchases will enable a dealer to secure an amount equal to the cost of the stock to the extent that the cost is a reasonable one incurred in the ordinary course of business.

OPA Sets Ceilings on Prices for Rubber Footwear, Mechanicals, and Tires; Other Price Rulings and News

Maximum Price Regulation No. 132, issued April 28 by the Office of Price Administration and effective May 11, establishes ceilings on manufacturers' wholesale prices for waterproof rubber footwear at the levels that prevailed under voluntary agreement during March.[1] The voluntary ceiling agreement had been signed by manufacturers who received more than 99% of the crude rubber allocated by the WPB for waterproof rubber footwear production during March.

Maximum Price Regulation No. 131, issued April 28 and effective May 11, placed ceilings on four grades of camelback at the maximum prices that prevailed during March. The prices for the following grades and specifications are:

Grade	Specifications: Maximum % by Volume		Maximum Price (¢ per Lb.)
	Rubber	Whole Tire Reclaimed Rubber	
A	73.0	0	28¢
C	47.9	31.4	23¢
E	26.0	57.0	18¢
F	0	89.3	18¢

At the present Grade F is the only grade available for recapping passenger-car tires.

Ceilings on manufacturers' prices for standard mechanical rubber goods were placed at manufacturers' list price levels, less all discounts, prevailing October 1, 1941, by Maximum Price Regulation No. 149, issued May 22 and effective May 27. The standard items, listed in Appendix A to the order, include: Belting, hose and tubing, jar rings, container sealing compounds, lined tanks, pipes and fittings, packing, plumbers' supplies and specialties, tape and thread, made in whole or in part of rubber. The order contains a formula for computing the maximum price for specially designed items. The base date set for computing the maximum price of most "tailor-made" goods—items ordinarily sold on a bid basis—is January 5, 1942. Effective dates applicable to governmental purchases are postponed to July 1 for War and Navy department contracts, and June 15 for all other departments.

Tire Prices Set

Following a study of tire companies' operating experience in January and February, 1942, by OPA, the Price Administrator established maximum prices (Maximum Price Regulation No. 119, effective April 27) on original equipment tires and tubes for automobiles and trucks, allowing 5% increases over levels that prevailed throughout 1941. These increases were granted in lieu of somewhat larger advances put into effect last January by the "Big Four", but subsequently withdrawn at OPA request.

Prices on original tires and tubes for farm equipment, however, will continue at the 1941 levels. A statement in this connection issued with the maximum price order by the OPA points out that "although the maintenance of original equipment prices for farm implements at the 1941 level has little effect on producers of this article, the maintenance of those prices is of extreme importance to consumers in order to forestall an upward spiral of the prices of farm products."

Maximum Price Regulation No. 143, issued May 14 and effective May 18, set maximum prices for all wholesale sales of new replacement tires and tubes for passenger cars, trucks, and other vehicles at the levels which previously applied to manufacturers and mass distributers under voluntary agreement with the OPA. Wholesalers were not heretofore specifically covered in the voluntary agreement.

Amendment No. 1 to Revised Price Schedule No. 63, issued April 22 and effective April 25, permits an increase of 16% in the maximum retail prices for new tires and tubes for passenger cars. These increases are calculated to cover the cost of the government's Tire Return Plan set up to relieve retailers and jobbers of the financial burden of carrying large stocks. No price adjustment was made on truck tires as they were not included in the Return Plan.

Amendment No. 2 to Revised Price Schedule No. 63, issued May 14 and effective May 18, set maximum retail prices on passenger-car tires and tubes manufactured after December 31, 1937 (classified as Exhibit C), but which did not appear as active brands on manufacturers' or distributors' price lists as of November 1, 1941, at a level corresponding to the ceiling prices for current brands in effect March, 1942. This amendment also made it clear that there are maximum retail prices on new tires and tubes for tractors, trailers, farm implements, industrial and off-the-road equipment, special-purpose buses and trucks, and motorcycles.

Rationing Rules Revised

Amendment No. 7 to the Revised Tire Rationing Regulations provides that after May 1 no new tires will be allocated for List A vehicles when use of a recapped tire is practical. After June 1 no new or recapped tires will be released to anyone who in the opinion of local rationing boards has not given proper care to the tire to be replaced. Such denial is designed to forestall deliberate driving past the point where a casing is recappable, and to prevent overloading and neglect.

Amendment No. 8 adds to List A eligibles vehicles used to tow house trailers from the factory to living sites for war workers. The length of haul is limited to 200 miles, and the tow car must not be used for other purposes.

Amendment No. 9, effective May 15, provides for replenishment of the amount of camelback used in retreading tire sizes 12.00-24 and larger. Previously a retreader could obtain a maximum of 55 pounds to replace material used in recapping or retreading any one tire, and it takes from 73 to as much as 650 pounds of camelback to retread size 12.00-24 and larger tires used on road graders, farm tractors, etc.

Amendment No. 10 to the rationing regulations permits, effective May 23, bus transportation companies to enter into new tire and tube leasing contracts with tire manufacturers or wholesalers.

Amendment No. 1 to Supplementary Directive No. 1-B, issued May 6, superseded the powers delegated by the WPB to the OPA in Rubber Order M-15-c and extended the authority of OPA to ration all tires, tire casings, and tubes made in whole or in part of any kind of rubber (whether made of crude, scrap, reclaimed, or synthetic rubber). The order also clarified OPA's authority to ration certain types of industrial equipment tires. Tires used on airplanes and those sold for military use and export were excepted. The WPB also retains control, under the Rationing Regulations, of tires for vehicles in the hands of manufacturers, distributers, and retailers.

The time within which long-haul truck and bus operators may apply to local rationing boards for emergency reserves of tires and tubes has been extended from May 15 to June 15. The emergency reserve plan was put into effect April 22 by OPA to provide truck and bus operators in certain classifications with purchase certificates enabling them to obtain tires beyond the number of spares ordinarily permitted under the Revised Tire Rationing Regulations, in order to eliminate delays due to blowouts.

Composition of Camelback for Civilian Car Retreading

The Standards Section of the Consumer Division, OPA released, May 12, physical data and the average composition of Grades C and F camelback produced by the industry in accordance with WPB orders restricting the amount of crude rubber for camelback for truck tires (Grade C) and limiting camelback production for passenger car retreading (Grade F) to all reclaimed rubber compounds. The Consumer Division's compilation follows:

	Grade C	Grade F
Percentage crude rubber by weight	38.4	...
Percentage reclaimed rubber by weight	30.8	75.9
Carbon black*	27.6	24.7
Specific gravity	1.16	1.23
Shore hardness	66	65
Tensile strength	3051	1400
Percentage elongation	564	359

* Including carbon black contained in reclaim rubber. Small quantities of certain other materials entering into the manufacture of carbon black have not been included in this table.

Grade F camelback now in production is reportedly capable of giving from 5,000 to 10,000 miles of service, depending upon the materials used and the technical skill in blending them.

Quota Statistics

Figures released recently by the OPA on the amount of tire and tube rationing quotas actually used in January reveal a small but important offset to the serious

[1] For complete details see our Apr. 1, 1942, issue, pp. 46, 96.

deterioration that has taken place in the nation's rubber position since that month's allotments were established. In the 40 states and the District of Columbia for which January reports are available, certificates issued for new passenger car tires amounted to 45% of the combined total of their quotas and the reserves which are set aside in each state for adjustment of emergency situations. A slightly higher percentage of truck tire quotas was used.

Complete reports on February rationing have been received from only 13 states, where 68% of passenger-car and 79% of new truck tire quotas and state reserves were used. Only 13% of the quota of recapped truck tires, rationing of which did not begin until late in the month, was absorbed.

Reports from 12 states for March show percentages, calculated on the same basis, at 83% for passenger-car tires, 91% for new truck tires and 72% for recapped truck tires.

These preliminary figures indicating a margin of quota allotment over actual use were welcomed by officials in the OPA tire rationing division, who point out that any saving at this time can be looked upon as an addition to the vitally important inventory for later use. In this connection they called attention to the fact that new passenger-car tire quotas for May were reduced from levels of preceding months in order to conserve supplies to take care of heavier consumption later when the tires now on eligible vehicles wear out and the rate of necessary replacements quickens.

The relatively low rate of quota use in January was attributed in part to unfamiliarity with rationing procedure and in part to the fact that rationing was not begun until the fifth day of the month. A further explanation was that eligible tire users were probably fairly well supplied at that time.

Partial returns on the proportions of quotas used in the first three months of this year compare as follows:

	Passenger Vehicles		Trucks		
	New Tires	Tubes	New Tires	Recaps	Tubes
January (40 states and the District of Columbia):					
State quotas plus state reserves	112,075	93,818	238,457	.....	199,350
Quota used	50,027	36,986	108,851	.....	83,862
% of state quota and reserve used	45%	39%	46%		43%
February (13 states):					
State quotas plus state reserves	25,980	21,774	51,442	27,550	87,773
Quota used	17,764	14,033	40,426	*3,506	37,409
% of state quota and reserve used	68%	65%	79%	*13%	43%
March (12 states):					
State quotas plus state reserves	25,162	20,836	60,794	26,834	66,936
Quota used	20,837	19,115	55,345	19,433	46,345
% of state quota and reserve used	83%	92%	91%	72%	69%

* Rationing of recapped tires did not begin until February 23.

May quotas that made available fewer certificates for new tires, but more for recapping than in April were announced April 24. (See page 300.) The total of new and recapped tires for May was greater than the combined total for April. This increase follows a seasonal pattern of expansion as warm weather permits a stepping up of industrial and construction activities. The May quota made available recapping certificates for List A passenger cars and motorcycles for the first time since rationing began.

The May quota provided only 55,573 new tires for List A passenger vehicles, but included 578,092 recapped tires upon which List A eligibles have first call, with the remainder available to List B users. The entire April quota provision for List A passenger vehicles was 101,636 new tires, with a separate quota for List B of 470,317 recapped tires. List A and B cars together were assigned an inner tube quota of 315,058 for May, against 285,977 in April.

For trucks also, the new tire quota for May was less than in April, with the difference more than made up by an increase in the number of recaps made available. The quota provides 238,259 new and 379,060 recapped tires for eligible trucks, buses, farm equipment, and industrial tractors, compared with 275,523 and 246,442, respectively, in April. The truck inner-tube quota is 328,836, against 260,983.

In releasing the May quotas, Mr. Henderson again pointed out that the recapping material available for application to passenger-car tires is made almost entirely of reclaimed rubber.

A quota of tires for rationing in June (see page 300) lower than the quota for May was announced May 22. This decrease is contrary to the seasonal pattern of replacement sales in previous years. For trucks, there is a moderate increase in the number of new tires made available, but this is more than offset by a cut in the recapped tire quota as compared with the current month. The truck inner-tube quota also is lower. In making the cut in the recapping rather than in the new tire quota for trucks, OPA took into consideration the approaching season of hot weather, which puts more strain on tires, particularly those used to carry heavy loads. Tire failure always increases in hot months, and in making a small boost in the new tire quota for trucks the OPA anticipated a relatively higher proportion of cases in which blowouts would make the casings now in service unfit for recapping.

Replacement sale figures for previous years cover new tires only. For passenger vehicle tires, the normal seasonal increase between May and June was 8%, and for truck tires 5%.

The new tires made available in the June quota may be issued only for use on List A vehicles and then only when the tires they have cannot be made serviceable by recapping. List A eligibles also have first claim on recapped tires, with the remainder available for rationing to List B users. Vehicles deemed most essential in the nation's economy are included in List A, while List B covers those considered of secondary importance.

Non-Essential Tire Requisition Foreseen

To emphasize the seriousness of the rubber situation to shippers, truckers, tire dealers, and the general public, OPA and ODT sponsored a series of meetings last month in the principal cities of the nation. Among the speakers was Charles F. Phillips, acting chief of the OPA Tire Rationing Division, who discussed the rubber situation under the title "The Battle of Rubber." Dr. Phillips stated it was highly probable that non-essential civilian tires would eventually be requisitioned for use on the 7,000,000 essential cars such as ambulances, physicians' and police cars, and vehicles necessary to transport war production workers to factories. To supply the 28,000,000 cars in the country there are now but 7,000,000 to 8,000,000 tires in dealers' and manufacturers' hands which must last for the duration of the war, and these, he said, can supply but one of every 14 peacetime demands. To conserve rubber Army tanks are now equipped with steel treads, and jeeps are mounted with passenger-car tires until they arrive in combat zones.

John L. Rogers, director of the division of motor transport, ODT, predicted that sightseeing and other buses chartered for pleasure trips will soon be transferred to more useful service.

William E. Hickey, president of the National Association of Independent Tire Dealers, speaking at the New York meeting at the Astor Hotel, May 12, told the audience that one of the most important provisions of the tire rationing program is the mandatory exchange of old tires for new ones. Bus and truck companies were urged to have all motor equipment competently inspected monthly as a tire conservation measure.

New Appointments

Appointment of Charles F. Phillips as chief of the tire rationing branch of OPA was announced May 19. For the past several weeks he had been acting chief of the branch. As associate price executive of the rubber and rubber products branch, Dr. Phillips took a leading part in developing the tire rationing program.

A. I. Henderson, deputy director of the Division of Materials, was appointed director by Donald M. Nelson on May 12 to fill the vacancy created by the resignation of William L. Batt, whose many other governmental activities forced his withdrawal.

Relinquishment by Frank Bane of his temporary post with the OPA to return to the Council of State Governments was announced April 27 by Price Administrator Henderson. Mr. Bane was lent to the OPA last November to develop a field organization plan. He was later induced to stay on in order to initiate this plan in principal cities, and again in January he

agreed, at Mr. Henderson's insistence, to continue further with the OPA to set up the organization for rationing tires and other commodities.

Other Price Regulations

General Maximum Price Regulation, issued April 28 by the OPA, placed ceilings on manufacturers and wholesale prices beginning May 11, and on retail prices beginning May 18 on virtually all commodities at the highest March levels of individual sellers. A list of separate maximum price regulations, issued in connection with the General Maximum Price Regulation and at the same time, included waterproof footwear and camelback for recapping and retreading tires. Manufacturers prices for these articles were placed at the March level, effective May 11. All waste materials up to the level of the industrial consumer were excluded from the General Maximum Price Regulation as a part of Supplementary Regulation No. 1, issued the same day.

Amendment No. 1 to Supplementary Regulation No. 1, issued May 9 and effective May 11, excepted rubber scrap and other selected commodities and services from the provisions of the General Maximum Price Regulation.

Price Administrator Leon Henderson announced May 14 that ceilings established by the General Maximum Price Regulation will control retail selling prices in cases in conflict with State Fair Trade Laws.

Maximum Export Price Regulation, issued by the OPA April 25 and effective April 30, establishes ceilings on all commodities and products sold for export. The provisions are applicable to any export license issued after, but not prior to April 30 by the Board of Economic Warfare.

Maximum Price Regulation No. 136, issued May 2 and effective May 15, establishes maximum prices for machines and parts not covered by other price schedules. The order specifies October 1, 1941, prices for all levels of distribution except retail. Certain subcontracted parts manufactured for incorporation into another machine by the buyer are exempted.

Supplementary Order No. 5—Licensing, issued May 5 and effective May 20, requires registration before June 20 of all dealers selling waste, scrap, or salvage material to industrial consumers. Licenses of dealers violating price schedules or regulations will be suspended as provided in the Price Control Act.

Heads Government Program to Get Wild Rubber

John W. Bicknell, managing director of the plantation division of the United States Rubber Co., New York, N. Y., has been loaned to the Rubber Reserve Co. to direct the government's wild rubber procurement program. Mr. Bicknell has been elected vice president of the Rubber Reserve Co. and will make his headquarters in Washington, D. C.

Executive Order Further Defining the Functions and Duties of the Office of Defense Transportation

By virtue of the authority conferred upon me by the Constitution and statutes of the United States, as President of the United States and Commander in Chief of the Army and Navy, it is hereby ordered:

1. In addition to the functions, duties and powers conferred upon it by Executive Order No. 8989, approved December 18, 1941, the Office of Defense Transportation shall:
   a. Include within the scope of its authority and responsibility, as defined in said order, all rubber-borne transportation facilities, including passenger cars, buses, taxicabs, and trucks.
   b. Develop programs to facilitate the continuous adjustment of the Nation and its transport requirements to the available supply of transportation services relying upon rubber.
   c. Formulate measures to conserve and assure maximum utilization of the existing supply of civilian transport services dependent upon rubber, including the limitation of the use of rubber-borne transportation facilities in non-essential civilian activities, and regulation of the use or distribution of such transportation facilities among essential activities.

2. The several Federal departments and agencies which perform functions relating to the conservation or use of rubber-borne transportation facilities shall, in discharging such functions, conform to such policies, programs, and measures as the Director of the Office of Defense Transportation may prescribe in the execution of the powers vested in him by this order and by Executive Order No. 8989.

3. Nothing herein shall be deemed in any way to limit the functions and authority of the Chairman of the War Production Board under paragraph 4 of Executive Order No. 8989 of December 18, 1941, and paragraph 1a of Executive Order No. 9040 of January 24, 1942, nor the rationing authority delegated to the Office of Price Administration by War Production Board Directives No. 1 of January 24, 1942, No. 1A of February 2, 1942, No. 1B of February 9, 1942, No. 1C of February 28, 1942, or any other Directive of the War Production Board supplementary thereto.

FRANKLIN D. ROOSEVELT

The White House,
May 2, 1942.

ODT Rulings

The Office of Defense Transportation issued April 23 General Orders Nos. 3, 4, and 5 regulating, beginning June 1, freight hauling by trucks. To conserve tires and equipment the regulations eliminate less-than-capacity loads and hauling by circuitous routes, place ceilings on overloading, and in the case of common carriers, order pooling of facilities. General Order No. 6, issued April 23, curtails local delivery service. After June 1 local carriers using rubber tires are required to reduce their total mileage by at least 25% each month as compared with the corresponding month in 1941. Public utility conveyances, farm vehicle transporting produce to market, and vehicles operated in the interest of public health and safety are exempt.

In the interest of rubber conservation, Joseph B. Eastman, Director of Defense Transportation, urged on April 18 staggering of working hours, elimination of unnecessary bus service, and wider use of school buses. April 27, interpreting ODT Order No. 2, Director Eastman held that in questions involving substitution of buses for street cars, public convenience is second to rubber conservation.

Catalogs for Export Must Be Censored

The Export Control Branch of the Board of Economic Warfare, Washington, D. C., which, through the Office of Censorship reviews technical publications destined for foreign countries to avoid the dissemination of information of value to the enemy, recommends that export of catalogs, pamphlets, bulletins, circulars, and other sales and service literature which may contain technical information be submitted for examination.

The material should be submitted to the Technical Data License Division, Export Control Branch, Office of Exports, Board of Economic Warfare, Washington, D. C., in advance of forwarding in export. Such submissions should include the following information:

(1) A sample copy of the item to be exported.

(2) A statement as to the past domestic distribution of the item.

(3) A statement as to the export distribution desired, giving the number of copies to be forwarded to each foreign country.

(4) A statement as to the method of foreign distribution desired; i. e., state whether the material is to be forwarded from the United States direct to individual consignees or is to be shipped in bulk to agents or representatives for subsequent distribution within the country of destination.

The information furnished will enable the office to determine which of the following export procedures should be authorized for the items submitted:

(a) Office of Censorship Publication License.

(b) Board of Economic Warfare License.

(c) Board of Economic Warfare inspection, approval, and mailing of the material to the foreign consignee.

(d) Board of Economic Warfare inspection and approval of mailing by the United States consignor to one or more foreign consignees.

United States Department of Labor, Washington, D. C., granted an exemption April 21 from the Walsh-Healey Public Contracts Act to permit the award of government contracts to rubber products and certain other factories employing females under 18 but over 16 years of age, subject to various conditions of the labor involved.

More Restrictions on Rubber Products; Additional WPB News

Use of scrap and reclaimed rubber during May in a specific list of articles continued to be limited to 60% of a formula based on average monthly use over a base period, according to Amendment No. 9 to Supplementary Order No. M-15-b to Restrict the Use and Sale of Rubber, which was issued April 27. (See page 252.)

It was ordered in March 20 that after May 1, products on list F[1] could be made only with the prior approval of the Director of Industry Operations. Since information on which specific allotments could be based had not yet been developed, this date was postponed to June 1 by Amendment No. 9.

The use of scrap or reclaimed rubber permitted by the formula for May was 60% of an amount comprising the average monthly consumption of reclaimed or scrap in List F products during the last quarter of 1941, plus 166⅔% of the average monthly consumption of crude rubber or latex in the List F products in the same period.

Specifications for making feeding nipples, designed to save approximately 45 tons of crude rubber annually, were ordered by the WPB, May 15, in Amendment No. 5 to Supplementary Order M-15-b-1. (See page 252.) The specifications set forth the maximum amount of rubber which may be contained in each thousand nipples. The total number to be manufactured will not be reduced. Resulting nipples will be satisfactory for feeding purposes, the Health Supplies Branch said. The specifications were worked out by the Rubber and Rubber Products Branch in collaboration with the Health Supplies Branch, the Bureau of Industrial Conservation, and the Division of Civilian Supply. The amendment will eliminate the production of the so-called "breast"-type nipple, which consumes three times the amount of rubber required to manufacture a nipple, conforming to the specifications.

The WPB extended indefinitely by Amendment No. 2 (see page 252), Conservation Order No. M-124, freezing stocks of rubber yarns and elastic threads in the hands of manufacturers, which expired April 30. The amendment also makes a few changes in the Order. It permits the sale of rubber or latex yarn or elastic thread which was in retail stocks on March 29, 1942; and permits use of such yarn or thread in the possession of "any individual not ordinarily engaged in the business of selling, knitting, weaving or otherwise using such yarn or thread"—that is, in the home. Besides the amendment exempts from the freeze order rubber yarn and thread for use in surgical supplies and to fill contracts for the Armed Forces and Lend-Lease. Amendment No. 2 requires a person who on April 25, 1942, possessed 25 or more pounds of rubber yarn and thread to file on or before May 11, 1942, with WPB a report on Form PD-433 of all rubber yarn, latex yarn, and elastic thread in his possession or under his control as of the date of his report.

Limitation Orders No. L-90 and L. 90-a, issued April 23 and immediately effective, reduced by about 50% the amount of elastic fabric that may be used in corsets, girdles, brassieres, combinations, and similar women's garments, and limited manufacturers to 75% of average monthly production during the first quarter of 1941. The use of any rubber yarn or elastic thread frozen under Conservation Order M-124, March 28, was prohibited. Definite but different limits are provided for panty-girdles, corsets, surgical-type corsets, heavy-weight foundation garments, and light-weight foundation garments, based upon the character and weights of the various elastic materials.

General Preference Order M-153, issued May 14 and immediately effective, prohibits the use and delivery of acrylonitrile (vinyl cyanide), ingredient of Buna N, except by authorization of the Director of Industry Operations.

Amendment No. 2 to General Preference Order M-10, issued April 29 and immediately effective, added all copolymers of polyvinyl chloride and all copolymers and polymers of vinyl chloride to the list of rubber substitutes subject to direct allocation by the WPB, affecting all compounds of the general type of Koroseal and Vinylite. Demand for these types of rubber substitutes for essential uses exceeds the supply; so this new amendment prevents the use of these materials for such miscellaneous civilian items as raincoats, shower curtains, etc.

New Appointments

The Bureau of Industry Advisory Committees recently announced the formation of the Waterproof Rubber Footwear Industry Advisory Committee. C. S. Reynolds is government presiding officer, and the committee members are: George H. Bingham, Jr., Cambridge Rubber Co., Cambridge, Mass.; Albert H. Wechsler, Converse Rubber Co., Malden, Mass.; Charles H. Baker, Goodyear Footwear Corp., Providence, R. I.; C. L. Munch, Hood Rubber Co., Watertown, Mass.; L. J. Larkin, LaCrosse Rubber Mills Co., LaCrosse, Wis.; William Rand, Tingley-Reliance Rubber Corp., Rahway, N. J.; Hugh Bullock, Tyer Rubber Co., Andover, Mass.; H. S. Marlor, United States Rubber Co., New York, N. Y.; Frank Petrik, Bata Shoe Co., Belcamp, Md.; Maurice C. Smith, Jr., Bristol Mfg. Corp., Bristol, R. I.; R. L. Lasser, Endicott-Johnson Corp., Johnson City, N. Y.; C. M. Parks, Goodyear Rubber Co., Middletown, Conn.; Max Kalter, Servus Rubber Co., Rock Island, Ill.

T. D. Foster, manager, Wiring Device Sales, General Electric Co., Bridgeport, Conn., is a member of the Electric Fuse Industry Advisory Committee.

L. B. Swift, president, Taylor Instrument Cos., Rochester, N. Y., has been appointed a member of the Industrial Instruments Industry Advisory Committee.

N. L. Etten, of American Wringer Corp., Woonsocket, R. I., has been appointed a special consultant representing household appliances in the Bureau of Industry Branches. The function of these industrial consultants is to furnish information to the Armed Services about the types of war work which each industry can handle, and their activities are directed toward finding existing facilities to speed the war effort.

Other Orders

Supplementary Directive No. 1-F, issued May 4 by the WPB, directed the OPA, in exercising rationing authority with respect to tires and other transportation products, to implement to the full extent administratively practicable the transportation policies of the ODT.

General Exports Order No. M-148, issued May 12, included crude and synthetic rubber and their products, and passenger, truck, and bus tires in a list of critical materials for export to the other American Republics to be given preference over other orders for such materials. Export licenses will be granted only within the limits of specific allocations by the Requirements Committee of the WPB.

General Preference Order No. E-1-b, issued and effective May 1, placed all new critical machine tools under a limited allocation system.

An amendment to General Preference Order M-41, issued May 2, extends A-10 ratings for chlorinated hydrocarbon solvents used in processing and manufacturing rubber as well as for certain other applications. The order, which extends one due to have expired May 15, will continue in effect until revoked.

Amendment No. 7 to Limitation Order No. L-1-a, issued April 25, rescinds the previous prohibition against equipping new heavy trucks produced under existing quotas with tires and tubes except for delivery to dealers. It is estimated that about 5,000 such trucks (those having a gross vehicle weight of 16,000 pounds or more) can now be equipped with tires and tubes. Arrangements have been made by the Rubber and Rubber Products Branch to make these tires available.

Exemption No. 3 to Limitation Order L-63, issued and effective May 12, removes tires, tubes, and automotive replacement parts from the supplies covered by the order, a general inventory control. Other WPB and OPA orders cover these articles adequately.

An amendment to Order No. M-66, issued May 14, prohibited the use of cashew nut shell oil in the manufacture of brake linings, except for the Army and Navy. Provided the oil comes from inventory, it may be used for making brake linings, molding resins, and resin solutions for electrical uses on A-2 ratings.

Limitation Order L-82, issued May 3, covers power cranes and shovels which can continue to be mounted on rubber tires, restricting production and sales of such equipment to approval of the Director of Industry Operations.

[1] See India Rubber World, Apr. 1, 1942, p. 53.

Limitation Order L-82-a, issued May 3, prohibits the future sale, lease, trade, loan, delivery, shipment, or transfer of more than 70 items of new rubber-tired construction equipment without specific authorization of the Director of Industry Operations. The order further prohibited production of such equipment between May 1 and June 1 except to fill Army, Navy, Maritime Commission, and Lend-Lease orders. Earth moving graders, scrapers, and power cranes and shovels needed in the war program were also exempted. After June 1 production schedules of all manufacturers must be approved by the Director of Industry Operations.

General Limitation Order No. L-110, issued and effective May 11, 1942, restricts the manufacture and sale of electro-plating and anodizing equipment.

Limitation Order L-111, issued and effective May 7, prohibits delivery of rubber-tired hand trucks and replacement tires for them, except where rubber tires are necessary to prevent accidents and explosion hazards. All other uses of rubber in the manufacture or assembly of such trucks are also prohibited.

Supplementary Limitation Order L-4-b, issued April 25, prohibits production of storage batteries for passenger automobiles and light trucks, except in specified minimum ampere hour capacities. Production of these sizes and models is limited from April 1 to September 30 to 75% of the number sold by the manufacturer during that period in 1941. Other rigid restrictions are included in the order for the purpose of saving rubber and other critical materials.

Supplementary Limitation Order L-4-c, issued and effective May 5, curtails production of replacement parts for civilian cars and light trucks to specified quantities of certain functional parts. Among the items prohibited are running boards, floor mats, seat cushions, window moldings, and other parts which are not essential to operation of a vehicle.

Interpretation No. 1 (issued May 15) of Preference Rating Order No. L-63 exempted sporting goods and other commodities from the Suppliers' Inventory Limitation Order. Inventories of these items remain subject to the terms of Priorities Regulation No. 1. Dealers needing priority assistance to obtain any of these materials must now apply on Form PD-1A.

Amendment No. 2 to Priorities Regulation No. 1, issued May 1, includes Free France, Iceland, Turkey, and Czechoslovakia to the list of countries whose government orders are defined as "defense orders" and automatically assigned as A-10 preference rating if no higher rating has been assigned by certificate or otherwise.

J. S. Knowlson, director of industry operations, announced May 13 a revised form of application for priority assistance under the Production Requirements Plan to be used for the third quarter of 1942. The new instructions permit the omission of a considerable part of the information previously required.

Per K. Frolich

President-Elect of A. C. S.

Per Keyser Frolich, director of the Chemical Division, Esso Laboratories of the Standard Oil Development Co., Elizabeth, N. J., and president-elect of the American Chemical Society, is internationally recognized for his work in the development of synthetic rubber.

He was born June 29, 1899, at Kristiansand, Norway, and was graduated from the Norway Institute of Technology in 1921 with a B.S. degree. As an American-Scandinavian Foundation Fellow, 1922-23, at the Massachusetts Institute of Technology, he received the M.S. in 1923 and an Sc.D. in 1925.

Dr. Frolich entered the teaching profession as an assistant in chemistry at the Norway Institute in 1919 and became instructor in chemistry and physics at the Kristiansand Business College in 1921. Then he completed his regular service in the infantry division of the Norwegian Army in 1922. He was a research assistant at M. I. T., 1923-25; research associate, 1925-27; assistant professor of chemical engineering, 1927-29; associate professor of chemical engineering, 1929, and assistant director of the research laboratories of applied chemistry, 1927-29. In 1929, Dr. Frolich joined the Standard Oil Development Co. as research chemist and became successively assistant director of research laboratories in 1931, director in 1933, and chief chemist, 1935. The next year the company named him to the position he now so capably fills.

Dr. Frolich has held several offices in the A. C. S. He served as vice chairman (1933) and chairman (1934) of the North Jersey Section; vice chairman (1936-38) and chairman (1938-40) of the Petroleum Division; councilor-at-large (1940); director, Rubber Division 1941. He has also been an associate editor of *Chemical Reviews*. He was on the executive committee of the American Section of the Society of Chemical Industry (1938-40), is on the same committee of the National Research Council's Chemical Division, and is suburban vice president of the Chemists' Club. Besides Dr. Frolich is a member of the American Society of Automotive Engineers, American Institute of Chemical Engineers, British Chemical Society, and Deutsche Chemische Gesellschaft.

Dr. Frolich has received wide recognition for his contributions to applied colloid chemistry, the chemical utilization of refinery gases, high-pressure oxidation, and electro-chemistry. In 1930 he was awarded the Grasselli Medal for the development of a new technique for the investigation of high-pressure synthesis and the catalyzation of high-pressure gas reactions. The experimentation he directed on high molecular weight polymers led to the development of Butyl rubber.

The scientist holds approximately 50 patents, issued or applied for, and he is the author of more than 50 technical papers.

Dr. Frolich lives at 930 Mountainview Circle, Westfield, N. J., with his wife and two daughters, Elizabeth Ann and Astrid. He finds relaxation and keen enjoyment in gardening and has attained an enviable local reputation for the gardens that surround his home. His other recreational hobbies are fishing and hiking.

Shipment of Kok-Sagyz Seed Here

A little more than 100 pounds of Russian dandelion (kok-sagyz) seeds for experimental planting has been received by the Bureau of Plant Industry of the United States Department of Agriculture. This first shipment, which came by air, will be supplemented soon, it is expected, by a similar shipment of about 400 pounds. Additional lots have been promised.

The Department emphasizes that these shipments are entirely for experimental plantings—to supplement the meager information now available in this country on the possibilities of *kok-sagyz* as a rubber producer. The seed will be tested this summer at Agricultural Experiment Stations in about 20 northern states, Canada, and Alaska, under climatic conditions like those of the areas in the U. S. S. R. where the dandelion is now being grown.

The Russian dandelion may be grown as an annual, but it is believed yields of only 30 to 50 pounds of rubber an acre may be expected, although somewhat higher yields occasionally have been reported. It has a leaf similar to the common dandelion of this country, but a much larger root.

The War Department, Washington, D. C., announced that tires having the regular standard tread will be used on all Army vehicles in the continental United States, with an estimated saving of about 50,000 pounds of raw rubber for the years 1942-43. Army trucks shipped overseas, however, will be equipped with treads suitable to the terrain upon which they will be used.

Frank L. Shew, recently employed by the W. J. Voit Rubber Corp., Los Angeles, Calif., is now chief chemist for the Grizzly Mfg. Co., of the same city.

EASTERN AND SOUTHERN

Robert G. Seaman

Robert G. Seaman Joins INDIA RUBBER WORLD Staff

Robert G. Seaman, who has had long experience in the technical side of the rubber industry, has joined the staff of INDIA RUBBER WORLD as technical editor. Mr. Seaman received a degree of Bachelor of Chemistry at Cornell University in 1925 and after diversified experience in the field joined the United States Rubber Co. in 1929, being located at the company's development laboratory in Passaic, N. J. In 1931 he was transferred to the Providence, R. I., plant where he was in charge of the laboratory control of latex and latex products and where he remained until joining INDIA RUBBER WORLD early in May.

Robert A. Engel, manager of the industrial chemical department, Givaudan-Delawanna, Inc., 330 W. 42nd St., New York, N. Y., has resigned and will be associated with the United States Army Chemical Warfare Service Planning Division in the New York office, effective June 1.

J. Strother Miller, technical adviser of the Barber Asphalt Corp., Perth Amboy, N. J., retired April 15 after 33 years of service.

Mercer Rubber Co., Hamilton Square, N. J., will erect a one-story factory addition. The company continues to operate normally on defense work.

Electrical Testing Laboratories, 2 East End Ave., New York, N. Y., has disposed of its plant and equipment to its employes who announce that the new company will operate as Electrical Testing Laboratories, Inc.

Charles E. Wood, Inc., dealer in crude rubber, balata, and allied products, recently moved its offices to 52 Wall St., New York, N. Y.

Coe Speaks at Salvage Symposium

Twenty-four engineering societies in the New York City area cooperated in a symposium on "Engineering Aspects of the National Scrap Salvage Program", held April 28 in the Engineering Societies Building, 29 W. 39th St., New York, N. Y. The meeting, under the auspices of the Industrial Salvage Section, Bureau of Industrial Conservation of the WPB, stressed the importance of various types of scrap as substitutes for raw materials in the war production program. John P. Coe, head of Synthetic Rubber Division of United States Rubber Co. and general manager of the firm's Naugatuck Chemical Division, discussing rubber scrap, pointed out that the collection system must be intensified to obtain an increased volume of discarded tires, tubes, boots and shoes, and mechanicals for current reclaim consumption needs.

Baldwin Southwark Division of the Baldwin Locomotive Works, Philadelphia, Pa., through Francis G. Tatnall, manager of the testing machine division, reported shipments of 88 Baldwin Southwark testing machines in the first four months of 1942 were the largest in the company's history and 57% greater than shipments of 56 machines in the first four months of 1941.

L. Albert & Son, rubber machinery dealer, is running to capacity at its four plants, in Trenton, N. J., Stoughton, Mass., Akron, O., and Los Angeles, Calif. I. H. Albert has gone to the Pacific Coast, where he will remain six weeks looking after the company's interests in that section.

Thiokol Corp., Trenton, N. J., has contracted for the erection of three small buildings and a large water tank.

The Polytechnic Institute of Brooklyn, Brooklyn, N. Y., has announced a series of about 25 lectures on "X-Ray Diffraction and Structure of Matter", by Dr. A. Reis. The first lecture was given May 8.

Elliot E. Simpson, a director of L. Drexsage Co., crude rubber brokerage, 29 W. 34th St., New York, N. Y., recently declared that a German process for reclaiming scrap rubber in 18 minutes is now available to this country. He said that Jacob Hirschberger, former owner of Gummiwerke Odenwald, Frankfurt a.m., where the process was first employed in 1936, offers the process to the government and individual reclaiming plants. The cost of production is said to be 50% less than present American costs. The method, reportedly, eliminates all chemicals and many of the usual preliminary operations.

R. W. Miller

Pittsburgh Plate Glass Co., Pittsburgh, Pa., has appointed R. W. Miller manager of the technical service department of the Columbia Chemical Division, succeeding G. L. Cunningham, resigned. Mr. Miller has been with the company since 1930, engaged mainly in research and technical service activities.

Titanium Pigment Corp., 111 Broadway, New York, N. Y., has moved its rubber laboratory from Sayreville, N. J., to 99 Hudson St., New York, N. Y. On May 1 the company opened Pacific coast offices at 350 Townsend St., San Francisco, Calif., and at 2472 Enterprise St., Los Angeles, Calif. R. Lee Wharton and E. G. Burling, respectively, are in charge of these offices.

Carborundum Co., Niagara Falls, N. Y., has announced the retirement of President Frank J. Tone, who becomes chairman of the board, a new position. Secretary Arthur A. Batts succeeds Dr. Tone as president. Vice President Henry P. Kirchner was made executive vice president in charge of operations and also a director. Frank J. Tone, Jr., a sales executive, was elected a vice president and board member; while Frank A. Vokrodt, auditor, was named secretary. Thomas B. Foot, assistant treasurer, was appointed treasurer to succeed Frank H. Manley, Sr., retired.

The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., has available for distribution two wall cards. One concerns the care of fire hose, and the other lists rules for preserving the life of air, water, steam, and other types of hose, and the proper attaching of couplings. Both are obtainable on request.

Edelco Rubber Co., recently announced removal of its offices to 425 Fifth Ave., New York, N. Y.

Whitehead Bros. Rubber Co., Trenton, N. J., continues to operate overtime in all departments. Company officials expect progress for some time to come.

Establishes Experimental Rubber Plantation

United States Rubber Co., Rockefeller Center, New York, N. Y., has leased an experimental plantation for the culture of rubber-yielding plants near Yuma, Ariz., and is establishing a field laboratory there in which scientists will determine by X-ray the rubber value of the plants.

"We started our search for additional domestic sources of rubber many months ago by reviewing the complete work of Thomas A. Edison on this subject, checking his original notes on more than 17,000 North American plants," said John McGavack, in charge of the company's wild rubber research. "Already we have studied thousands of plants and have determined by X-ray whether the juices could be converted into useful rubber.

"By useful rubber we mean rubber which may be vulcanized and used in products. There are, for instance, plants such as milkweed which contain a rubber-like substance and which exist in substantial quantities. However milkweed rubber is not useful because the vulcanized product has poor properties. This fact is clearly revealed by an X-ray examination.

"Our study to date has revealed a number of plants which contain good rubber and which show promise for future development. Two of the most promising are the *Forsteronia Floribunda*, a plant native to Central America, and the *Cryptostegia Grandiflora*, now grown in Florida, California, and Arizona. Both plants show an X-ray pattern quite similar to a good quality of *Hevea*. . . . Both plants will yield annual crops of rubber; whereas guayule requires four to five years for a substantial harvest.

"We should like to emphasize, however, that neither these plants nor the work we are doing with other plants on our experimental plantation will solve the current critical rubber shortage. After useful varieties of rubber-yielding plants have been determined, much time is required to accomplish large-scale multiplication of these plants through production of seed, or by making cuttings. Therefore, our work is primarily for the future."

Dr. McGavack announced that R. E. Beckett, formerly of the Department of Agriculture Experiment Station, Bard, Calif., had been placed in charge of the project in Arizona.

Other Company News

Announcement by U. S. Rubber of Uskon, a conductive rubber belting designed to carry off static electricity caused by friction, also provides a new safeguard in handling materials which carry electrostatic charges. Low resistance of the belt material obviates any danger of an electrical connection from one transmission line to another in case of a short circuit. These conductive V-belts are also available for drives on fans handling explosive vapors and other equipment in hazardous industries.

The first synthetic rubber tires delivered for testing purposes, by U. S. Rubber for the Public Service buses of New Jersey. Above, F. C. Burton (*left*), superintendent of maintenance for Public Service, and George Headley, U. S. Rubber field representative, watching John Nalisnick mount the new tire

F. B. Davis, Jr., president, recently announced the prize winners of the 1941 United States Rubber Co. Safety Contest. In the larger plants class Naugatuck Footwear was awarded the President's Prize of $500; Mishawaka, second prize of $150; and Gillette Tire, third prize of $75. In the smaller plants division the President's Prize of $100 went to Latex Fiber Industries; second prize of $75, to Shoe Hardware; third prize of $50, to Naugatuck Chemical.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., effective June 1, renamed its R. & H. Chemicals Department the Electrochemicals Department to describe more effectively the products created.

Effective May 31, T. S. Grasselli, a vice president and member of the board at du Pont, resigned because of ill health. Mr. Grasselli joined the Grasselli Chemical Co., Cleveland, O., in 1893 and served in various departments until 1916 when he was elected president. After the merger of Grasselli and du Pont in 1929 he became a director of the latter company and was elected a vice president in 1936.

O. M. Hayden, manager of du Pont's Rubber Chemicals Division, discussed "Rubber and the War" April 30 at a meeting for engineers and technologists at the Philadelphia Engineers Club. The meeting was sponsored by the Philadelphia District Committee of the A.S.T.M.

Barber Asphalt Corp. held its annual stockholders' meeting at Barber, N. J., May 15, when T. Rieber was reelected a director. At the meeting of the board in Philadelphia the same day, Mr. Rieber was elected president of the corporation, succeeding Frank Seamans, who retired after 50 years with the company.

The illustration of the Downington-Huber Squeegee Pump published on page 157 in the May issue was inverted through an error in make-up.

Allan A. Lubitz, president, American Firstoline Corp., 420 Lexington Ave., New York, N. Y., has resigned as a director of the Gulton Metal Refining & Chemical Corp., Metuchen, N. J., and Mr. Lubitz, as well as the Firstoline Company, has severed all connections with the Gulton concern, which is in process of liquidation, having suspended operations the end of February. Mr. Lubitz and American Firstoline will continue the manufacture, conversion, distribution, and export of high-grade zinc oxides, zinc carbonate, zinc dust, zinc stearate, and other chemicals and pigments, for their own account.

Industrial Marketers of New Jersey last month held an election of officers. Included are vice presidents Edward J. Pechin, advertising manager of E. I. du Pont de Nemours & Co., Inc., and Ralph N. Hanes, sales promotion manager of mechanical goods, United States Rubber Co.; and treasurer James J. DeMario, advertising manager, Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc.

E. V. O'Daniel, vice president, American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., was one of the directors elected May 19 at the annual meeting of the Commerce & Industry Association of New York, Inc., 233 Broadway, New York.

American Management Association, 330 W. 42nd St., New York, N. Y., held a Production for Victory Conference May 13 and 14 at the Hotel Astor, New York, attended by more than 600 plant executives. P. L. Dildine, manager, factory standards, The B. F. Goodrich Co., Akron, O., described production conversion and training of key personnel for new production activities at Goodrich plants. C. A. Hubner, supervisor of production, American Hard Rubber Co., Butler, N. J., was a speaker at the production control clinic of the conference.

MIDWEST

William Welch, president, Midwest Rubber Reclaiming Co., East St. Louis, Ill., told the WPB National Salvage Clinic meeting at Cleveland, O., April 22, that it may be necessary to pass laws requiring individuals to surrender worn tires and other scrap rubber to a scrap collection agency to obtain sufficient scrap to meet the war production demands for reclaimed rubber.

Monsanto Chemical Co., St. Louis, Mo., has announced the retirement, effective June 30, of G. Lee Camp as a vice president, director, and co-general manager of the organic chemicals division. Mr. Camp, who joined Monsanto 12 years ago, retires following his sixtieth birthday on June 11.

OHIO

New Goodrich Synthetics

The B. F. Goodrich Co., Akron, O., recently announced the development of three new types of Ameripol.

A black thread, which the company believes to be the first synthetic rubber thread developed in the United States, is reported to be non-toxic and to resist the effects of dyeing, bleaching, and the oils of body perspiration to a greater degree than does natural rubber. It can be handled by textile machinery now in use and will be sold for milling in both the covered and uncovered forms. None is now available for civilian purposes, but when supplies of synthetic rubber have increased beyond war needs, the thread will prove applicable to many civilian uses.

Ameripol sponge rubber, also developed from the basic Ameripol compound (polymerized butadiene), is said to have all the essential characteristics of natural sponge rubber and some superior qualities. Its resistance to heat, aging, vegetable and petroleum oils, and cyclic and chlorinated hydrocarbons is reportedly better than that of natural rubber. The resiliency of the soft variety is retained for an indefinite period, dependent upon the service to which it is subjected. As in natural sponge rubber, continuous compression will cause some degree of permanent set in time. The hard variety is reportedly suitable for specialized insulating and float jobs. It can be sawed or drilled. The soft sponge is available in medium density and black only, and is supplied in slabs, tubing, cord, and molded shapes. The product is blown and formed under heat and pressure in hydraulic molds by the same method used in making sponge from natural rubber.

A hard rubber, also made from Ameripol, is said to withstand temperatures 100° F. higher than hard rubber made from natural crude and is expected to overcome many of the limitations which have previously restricted the service of hard rubber under extreme conditions.

Transfers of Personnel

W. S. Richardson, general manager of the industrial products sales division, has announced the appointment of George Livermore, former Goodrich representative on products for oil pipe line and oil distributing agencies in the Southwest, to succeed John S. Gulledge as St. Louis district manager of the division. Mr. Gulledge resigned to enter the Army Air Corps.

J. S. Pedler, manager of aeronautical sales, announced the opening of an aviation branch office at Dallas, Tex., with William G. Zink in charge. For the past three years Mr. Zink has been operations manager of the aeronautical division.

E. A. Stevens, former managing director of Goodrich Co. (S.S.), Ltd., Goodrich rubber buying subsidiary in Singapore, has been appointed assistant to the director of purchases, and H. C. Bugbee has been named manager of the crude rubber division, according to A. D. Moss, director of purchases of the B. F. Goodrich Co.

P. W. Stansfield, since June 1, 1939, manager of Goodrich farm service tire sales, has been given the added duties of directing the sale of industrial tires, according to J. E. Powers, truck and bus tire department manager.

Cleveland E. Dodge was elected a company director April 21. Mr. Dodge, vice president and a director of the Phelps Dodge Corp., New York, N. Y., fills the vacancy caused by the resignation of Arthur B. Newhall, recently appointed rubber coordinator.

Vice President J. J. Newman has been elected a director of the Rubber Manufacturers Association, Inc., New York, N. Y., succeeding A. B. Newhall.

Other Goodrich News

Goodrich rubber heels with maple-wood cores are now in quantity production. According to the company, the new heel provides wear and walking comfort comparable to the pre-war style and will save about 5,000 tons of rubber yearly. It can be made on standard rubber heel manufacturing machinery, applied with equipment now in use in shoe factories, and can also be attached by cobblers.

The company has issued a Spring Sale Catalog for Goodrich dealers listing bicycles, auto accessories and parts, radios, lawn and garden supplies, sportswear, sporting goods, luggage, home necessities, and other items.

Goodyear Personnel Changes

At a recent directors' meeting The Goodyear Tire & Rubber Co., Akron, made J. M. Linforth, subsidiary sales company vice president, a vice president of the parent organization; while C. F. Stone, a former vice president, was named to the executive and finance committee.

At the same time the board of directors reelected the company's executive officers, as follows: P. W. Litchfield, chairman of the board; E. J. Thomas, president; R. S. Wilson, P. E. H. Leroy, and C. Slusser, vice presidents; Z. C. Oseland, treasurer; W. D. Shilts, secretary; C. H. Brook, comptroller; H. W. Hillman, assistant treasurer; H. L. Hyde, general counsel and assistant secretary; W. M. Mettler, assistant secretary; and C. L. Weberg, H. D. Hoskin, and H. J. Young, assistant comptrollers.

Baxter Wood, on Goodyear sales and service work since 1927, has been called to the Quartermaster General's staff of the War Department as a tire specialist.

Vaughn Y. Bell, former district manager in Cleveland, O., has been given a six months' assignment as general assistant to D. R. Mackenroth, general manager of Goodyear retail stores.

H. H. Slevin, former store manager in Chicago, Ill., has succeeded W. Wetherbee as staff man in the truck tire department on tractor tire sales at the Akron plant. Mr. Wetherbee is now Goodyear Albany district manager.

Ludwig Ogle, Goodyear's manager in Finland, and Clarence H. Hedenberg, secretary-treasurer of the Goodyear plant at Norrkoping, Sweden, returned last month to the United States on the *Drottningholm*, one of the first passenger boats to arrive from Scandinavia since this country entered the war.

H. S. Firestone, Jr., president of the Firestone Tire & Rubber Co., Akron, has been chosen for the second consecutive year as chairman in Ohio of the National USO War Fund campaign.

NEW ENGLAND

George C. Sheldon

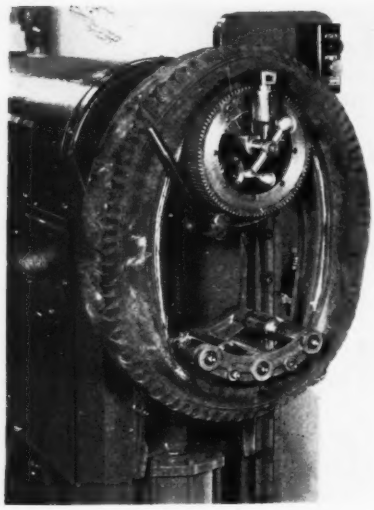
The Union Bay State Co., compounder of industrial cements and coatings, Cambridge, Mass., has appointed George C. Sheldon general sales manager. Mr. Sheldon, formerly vice president of the General Tire & Rubber Co. of Boston, is a graduate of Bates College and Harvard University Graduate School of Business Administration.

Cambridge Rubber Co., Cambridge, Mass., according to President Warren MacPherson, has appointed H. J. Kroto executive vice president and general merchandise manager of its subsidiary, Cambridge Rubber, Ltd., Montreal, P. Q., Canada.

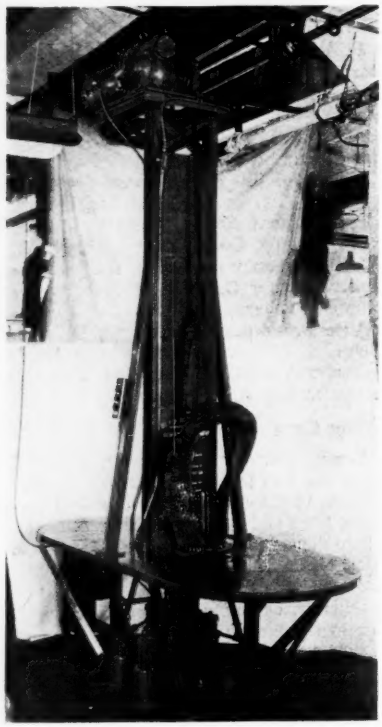
Ralph D. Berry, vice president of the Davol Rubber Co., Providence, R. I., was elected treasurer of the New England Purchasing Agents Association at the annual meeting May 11 in Boston, Mass.

Eight rubber manufacturers in Rhode Island during April paid out $302,515 in wages, compared with $378,000 in March and $401,000 in April, 1941. Kilowatts of electric power consumed for the respective periods were: 1,867,000; 2,166,000; and 3,083,000.

Improved Black Rock Debeading Equipment Shown



Slitter with Tire in Position for Cutting Operation



Puller Removing Bead Wire from Tire

A number of members of the rubber trade, particularly those directly interested in reclaiming, visited the plant of the Black Rock Mfg. Co. in Bridgeport, Conn., recently to witness demonstrations of the improved models of the efficient debeading cutter and puller introduced to the trade by the company some months ago.[1] The debeading equipment was tested in actual operation, over a lengthy period, in the plant of The B. F. Goodrich Co., Akron, O., where it was developed before the Black Rock company took over its manufacture.

The performance of the improved model was impressive, with its increased speed and accuracy in operation. With competent workers, from three to four tires may be cut and debeaded per minute. The tire is first placed in the cutter between guides which hold it in position. A tensioning device then draws the tire taut; two knives, one on each side, move into position, and the tire is revolved until the cutting cycle is completed. The position of the knives and the depth of the cut may be regulated easily for the type of tire handled. After cutting, the tire is clamped to a table under the puller and hooks engage and remove the bead cleanly with one operation. Only in rare cases is the bead so rusted or corroded as to bar quick removal.

The equipment is operated by the use of both compressed air and electric motors, being entirely automatic with a timing device controlling the operations in sequence.

Under ordinary methods the bead section of the tire is cut off and discarded, resulting in a loss of from 17 to 22% of reclaimable rubber. Through the use of the Black Rock equipment this loss is cut to from 5% to 6%, and even the bead wires are removed so cleanly that they may be sold as metal scrap at a fair price.

In view of the growing shortage of discarded tires for reclaiming purposes, the savings possible with the new debeader are of particular interest and importance, a fact realized by those witnessing the demonstrations.

[1] See India Rubber World, Aug. 1, 1941, p. 55.

Godfrey L. Cabot, Inc., Boston, Mass., announces that another of the company's carbon black plants has been converted to the production of Spheron, Grade 9, exclusively, in order to meet the demand for this particular type of carbon black used in the processing of reclaimed rubber.

Fast Curing Accelerator

ZIPACEL (piperidinium pentamethylene-dithiocarbamate) is a white to light-cream colored rubber accelerator made by The Barrett Division, Allied Chemical & Dye Corp., 40 Rector Street, New York, N. Y. It has a specific gravity of 1.13 and a melting point above 165° C. Zipacel is reportedly fast curing at low temperatures and was developed for use in fast curing cements, as a primary accelerator for latex, and for use in milled compounds such as spread sheeting.

As a primary accelerator in latex compounds it has been found to function well in proportions of 0.25 to 1.0 part per 100 parts rubber hydrocarbon. One to two parts sulphur and one to five parts zinc oxide are used, depending upon the type of compound. It is claimed that precuring of the latex mix is not a serious factor in compounds containing Zipacel, nor does this accelerator contribute to thickening or coagulation difficulties of well-balanced latex recipes.

Use as a secondary accelerator in milled stock with thiazole-type accelerators is said to give a rapid cure with resultant high modulus and age resistance.

Buffer Solutions for pH Tests

THE Cargille Buffer Set No. 1, containing 17 buffer tablets, was designed for use with Hydrion wide-range or other pH test paper for control tests in plants by unskilled workers and for quick preliminary laboratory tests. Solutions of known pH, made by dissolving the tablets in distilled water, are applied to the test paper to bring out the color for any half unit from pH 3 to pH 11. The colors are used for reference to judge the pH of the sample under test. Readings can be made to one-half pH units, and comparisons made with these reference colors are said to be more accurate than those made with color charts. Each tablet makes sufficient solution for about 200 tests. A vial and applicator rod is furnished for each solution. R. P. Cargille.

Solvent-Resisting Paint

A GAS-PROOFING paint, designed for protection of enclosures where destructive fumes are released, has a Resistoflex PVA base which is said to impart flexibility, high tensile strength, and immunity to aging and oxidation to the impermeable film. Developed for coating wood, beaver board, and composition fiber building boards, the paint is reported to be unaffected by organic solvents, oils, fuels, and fumigating gases. It is made in the form of a primer and a finished coat by Resistoflex Corp.

SAE Cancels Summer Meeting

A NUMBER of local meetings will be substituted for the annual summer meeting of the Society of Automotive Engineers, J. A. C. Warner, secretary of the Society, announced on April 23, because of the continued presence of diplomats of enemy countries at White Sulphur Springs and the inability of railroads to guarantee sufficient accommodations to any other suitable place. The papers to have been presented at the summer conference will be given at special local meetings, and many of them will be published in the July issue of the *SAE Journal*, which will constitute a special issue to be known as "Summer Meeting Issue."

LEGAL

Holds Huber Not Infringing

A decision of the United States District Court for the Northern District of Texas handed down some time ago and holding that J. M. Huber, Inc., New York, N. Y., did not infringe patents held by Godfrey L. Cabot, Inc., Boston, Mass., covering the pelletizing of carbon black, was upheld by the Fifth Circuit Court of Appeals, in New Orleans, La., on May 7.

FINANCIAL

American Cyanamid Co., New York, N. Y., and subsidiaries. March quarter: net income, $1,127,927, equal, after preferred dividends, to 38c each on 2,618,364 common shares outstanding, against $1,120,505, or 39c each, last year; taxes, $4,133,782, against $2,021,834.

Baldwin Locomotive Works, Philadelphia, Pa., and wholly owned subsidiaries. Year ended March 31, 1942: consolidated net profit, $4,229,821, against $935,539 for the previous 12 months; consolidated sales, $93,423,475, against $29,894,725.

Baldwin Rubber Co., Pontiac, Mich. March quarter: net profit, $88,914, equal to 28c each on 315,254 common shares, against $248,979, or 79c a share, a year ago; reserve for taxes, $21,182, against $117,166. Nine months ended March 31, 1942; net profit, $267,239, or 85c a share, against $539,040, or $1.71 a share, in the period ended March 31, 1941; tax reserve, $193,113, compared with $255,056.

Barber Asphalt Corp., Barker, N. J. March quarter: net loss, $21,379, against loss of $234,689 last year.

Belden Mfg. Co., Chicago, Ill. March quarter: net profit after $26,318 provision for contingencies and $268,000 estimated taxes, $153,339, equal to 63¢ each on 241,547 capital shares, against $130,014, after $175,901 federal taxes, last year, or 54¢ a share; net sales $2,273,402, against $2,179,772.

Brown Rubber Co., Inc., Lafayette, Ind. Year ended January 3, 1942: net profit, $20,780, equal to 10¢ each on 200,000 shares, against $33,013, or 16c a share, in the preceding 53 weeks.

Columbian Carbon Co., New York, N. Y., and subsidiaries. March quarter: net income, $841,814, equal to $1.57 each on 537,406 shares outstanding, against $1,089,335, or $2.03 a share, last year; provision for federal taxes, $600,000, against $300,000.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Armstrong Cork Co.	Com.	$0.25 interim	June 1	May 4
Armstrong Cork Co.	Pfd.	$1.00 q.	June 15	June 1
Belden Mfg. Co.	Com.	$0.35	June 1	May 18
Boston Woven Hose & Rubber Co.	Com.	$0.50	May 25	May 15
Canada Wire & Cable Co., Ltd.	"A"	$1.00 q.	June 15	May 1
Canada Wire & Cable Co., Ltd.	"B"	$0.50 q.	June 15	May 1
Canada Wire & Cable Co., Ltd.	6½% Pfd.	$1.625 q.	June 15	May 1
Crown Cork & Seal Co.	Pfd.	$0.56¼ q.	June 15	May 29
Detroit Gasket & Mfg. Co.	Com.	$0.25	July 20	July 3
Dewey & Almy Chemical Co.	Com.	$0.25	June 15	May 29
Dewey & Almy Chemical Co.	"B"	$0.25	June 15	May 29
E. I. du Pont de Nemours & Co., Inc.	Com.	$1.00 reduced	June 13	May 25
E. I. du Pont de Nemours & Co., Inc.	$4.50 Pfd.	$1.12½ q.	July 25	July 10
Dunlop Rubber Co., Ltd.	Ord. 8%	.....	.....	.....
Electric Storage Battery Co.	Com.	$0.50	June 30	June 9
Firestone Tire & Rubber Co.	6% Pfd. "A"	$1.50 q.	June 1	May 15
General Electric Co.	Com.	$0.35	July 25	June 26
B. F. Goodrich Co.	Pfd.	$1.25 q.	June 20	June 19
Goodyear Tire & Rubber Co.	Com.	$0.37½	June 15	May 15
Goodyear Tire & Rubber Co.	$5 Cm. Cv. Pfd.	$1.25 q.	June 15	May 15
Hercules Powder Co., Inc.	Com.	$0.50 reduced	June 25	June 12
Hewitt Rubber Corp.	Cap.	$0.25	June 15	May 29
I. B. Kleinert Rubber Co.	Com.	$0.20	June 12	June 1
Midwest Rubber Reclaiming Co.	Pfd.	$1.00 q.	June 1	May 20
Okonite Co.	Com'	$0.50 extra	May 1	Apr. 21
Okonite Co.	Com.	$1.50 q.	May 1	Apr. 21
Okonite Co.	6% Pfd.	$1.50 q.	June 1	May 15
Raybestos-Manhattan, Inc.	Com.	$0.37½	June 15	May 29
Thermoid Co.	Pfd.	$0.75 q.	June 15	June 5
Tyer Rubber Co.	6% Pfd.	$1.50 q.	May 15	Apr. 30
United Elastic Corp.	Com.	$0.30	June 24	June 4
Westinghouse Air Brake Co.	Com.	$0.25	June 15	May 15
S. S. White Dental Mfg. Co.	Com.	$0.30	May 15	May 1

Crown Cork & Seal Co., Baltimore, Md., and wholly owned domestic subsidiaries. March quarter: net profit, $328,046, after federal income and excess profits taxes of $560,344, equal, after preferred dividend requirements, to 39c each on 517,625 common shares, against revised net profit of $415,073, or 56c a common share, last year, after tax deductions of $293,864.

Converse Rubber Co., Malden, Mass. Year ended January 31, 1942: net income, $151,585, against $16,978.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. March quarter: net income, $14,310,157, equal to $1.18 a common share, against $20,754,161, or $1.77 a share, in the first quarter of 1941; sales $122,023,170, against $103,983,376; taxes, $25,250,000 against $17,143,000.

Flintkote Co., New York, N. Y., and subsidiaries. Quarter ended March 28, 1942: net income, $306,490, or 37c each on 705,435 common shares, against $305,787, or 45c each on 686,196 shares, in the corresponding period of 1941; net sales, $5,905,374, against $4,775,695; reserve for taxes, $482,536, against $129,638.

General Electric Co., Schenectady, N. Y. March quarter: net profit, $10,329,774, or 36¢ a common share, against $11,377,969, or 39¢ a share, in the first quarter last year; net sales, $190,861,108, against $129,860,707; provision for taxes, $37,000,000, against $18,000,000.

General Motors Corp., Detroit, Mich. March quarter: net income, $23,229,991, equal, after preferred dividends, to 48c each on 43,499,641 common shares, against $64,598,337, or $1.44 a share, in the first quarter of 1941; net sales, $439,336,580, against $649,192,619; federal income and excess profits taxes, $31,654,000, against $65,152,000.

Granby Elastic Web Co., Ltd., Granby, P. Q., Canada. For 1941: net profit, $64,390, equal, after preferred dividend requirements, to $1.25 a common share; net working capital, $339,623, contrasted with $277,165 at the end of 1940.

Hercules Powder Co., Wilmington, Del. First quarter, 1942: net earnings, $1,201,810, equal, after preferred dividends, to 81c each on 1,316,710 common shares, against $1,360,426, or 93c a share, in the corresponding period of 1941; net sales, $27,271,477, against $15,798,855; provision for taxes, $5,689,645 against $2,018,440.

New Jersey Zinc Co., New York, N. Y., March quarter: net profit, $2,291,334, equal to $1.17 each on 1,963,264 shares, against $2,813,509, or $1.43 a share, last year.

O'Sullivan Rubber Company, Inc., Winchester, Va. For 1941: net income, $174,807, against net loss of $103,325 in 1940.

Raybestos-Manhattan, Inc., Passaic, N. J., and domestic subsidiaries. March quarter: net profit, $485,619, equal to 77c each on 628,100 shares, against $573,282, or 91c each, last year.

Servus Rubber Co., Rock Island, Ill. Year to February 28: Net profit, $220,328, equal after preferred dividends, to $1.50 each on 137,275 common shares, against $194,108 or 99¢ each on 172,761 common shares in the year ended February 28, 1941.

Skelly Oil Co., Kansas City, Mo., and subsidiaries. March quarter: net income, after $1,157,500 provision for income and excess profits taxes, $1,300,036, equal to $1.32 each on 981,348 common shares, against $898,917, or 91c a share, for the first quarter last year after taxes of $246,000.

Timken Roller Bearing Co., Canton, O., March quarter: net profit, $1,461,766, equal to 60c each on 2,417,380 shares, against $2,613,451, or $1.08 a share on 2,415,380 shares, last year; taxes, $1,560,900 income tax and $4,351,000 excess profits tax, computed under Revenue Act of 1941, plus $1,772,000 to cover possible tax increases and other contingencies.

United Carbon Co., Charleston, W. Va., and subsidiaries. March quarter: net profit, $522,111, after $345,000 provision for federal income and excess profits taxes, equal to $1.31 each on 397,885 shares of common stock, against $540,028, or $1.36 a share, in the corresponding period of 1941.

Westinghouse Air Brake Co., Wilmerding, Pa., and subsidiaries. March quarter: net profit, $1,117,867, equal to 35c each on 3,172,100 capital shares, against $1,358,768, or 42c a share, in the same period of 1941.

New Incorporations

Aztec Mineral Rubber Corp., 4700 Indianapolis Blvd., East Chicago, Ind. Capital 4,000 shares, no par value. H. W. Culmer, R. D. Netherton, and C. H. Thrailkill. Processing, mining, and marketing of mineral rubber.

Duro Gloss Rubber Co., 30 Lenox St., New Haven, Conn. H. E. H. Cox, president, treasurer; J. H. Parker, secretary; J. Hamerschlag, sales manager; T. F. Coffey, purchasing agent, assistant secretary. Rubberized and pyroxylin coated fabrics.

A. C. Hartke & Co., Inc., Buffalo, N. Y. Capital 200 shares, no par value. Rubber goods.

Hy-Kor Products Co., Inc., Dover, Del. Capital 150 shares, no par value. Synthetic rubber.

Jersey Rubber Washing Co., 36 Hudson St., Jersey City, N. J. F. and A. M. Brockel, 27 Glen Ridge Parkway, Montclair, N. J., and G. R. Brockel, 50 Yale Ave., Bloomfield, N. J. Washing crude rubber.

Latex Corp. of America, 605 Broad St., Newark, N. J. Capital 100 shares, no par value. H. Kent, 34 Parkway, Yonkers, N. Y.; A. Goldsmith, 359 Fort Washington Ave., New York, N. Y., and E. Katz, 90 North Eleventh St., Newark, N. J. To manufacture various kinds of rubber goods.

James Martin Rubber Corp., New York, N. Y. Capital 100 shares, no par value. Tires and rubber products.

Northern Rubber Corp., Green Bay, Wis. Capital $10,000 consisting of 100 shares of $100 par value stock. J. R. Jackson, H. J. DeWitz, and L. D. Quigley. To manufacture and acquire goods of every description and deal therein.

New du Pont Chemicals

THREE new chemicals for the rubber industry recently were developed by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Neoprene Latex Type 60 is a concentrated neoprene latex containing about 60% solids by weight. It is compounded and processed in essentially the same way as is Neoprene Latex Type 57 and is reportedly useful in the manufacture of extruded latex threads and molded items which are made by the gelation process.

Aquarex MDL is an aqueous paste which may be substituted in many cases for Aquarex D. Exceptions include uses in which Aquarex D is employed dry as in a mixture with talc to make a removable dusting powder for rubber goods. Aquarex MDL is cheaper than Aquarex D both on a use and a weight basis. But weight for weight it is not so effective as Aquarex D; generally from 1.7 to two times as much Aquarex MDL is required.

Thermoflex C is a flex-crack resisting antioxidant similar to the company's Thermoflex A.

CANADA

Williamson's Statement

Canada expects to keep essential vehicles on the road for the next four years with existing supplies of rubber through operation of a rationing system which trims down transportation to the bare necessities and makes use of "hand-me-down" tires to the last ounce of rubber, according to Alan H. Williamson, controller of supplies in charge of rubber in the Canadian Ministry of Munitions and Supplies.

Mr. Williamson explained the Canadian system on a recent official visit to Washington, D. C., for conferences with the War Production Board.

The Canadian program includes rationing of used as well as new and retread tires and confers full authority upon the Controller to requisition the tires of 800,000 passenger car owners. So far the requisitioning power has not been exercised, but will be if and when necessary, Mr. Williamson declared.

The story of diminishing rubber supplies is told in Canadian production figures for 1940 when output was 40,000 tons, which dropped to 6,000 tons in 1942.

The Canadian gasoline rationing system automatically contributes to tire conservation. Two other factors in tire control are the regulation of trucking and bus transportation.

Canada's stockpile of tires is held by 800,000 car owners who can wear them out only at the rate of 5,000 miles a year, (under gasoline rationing) Mr. Williamson pointed out. Dealers may purchase these tires, and a percentage of them will thus be diverted to essential uses. Every tire sold, Mr. Williamson emphasized, means a used tire taken in exchange whether the sale be of a new, used, or retreaded tire. The exchanged tire becomes a "hand-me-down" to the next essential class of tire user.

Canada has 12,500 tire dealers whose establishments are policed by 50 tire inspectors to prevent bootlegging or smuggling of tires. Action against dealers for such violations have been taken in only 15 instances, declared Mr. Williamson.

With a reclaim capacity of 10,000,000 pounds annually, Canada decided to use United States reclaiming facilities instead of expanding her own. In 1942 it is estimated scrap rubber collection will reach 20,000 tons as compared with 8,000 in 1941. The Canadian plan provides for purchase of scrap with an equalized price for all grades in every section of the country, thus leveling all freight differences. Scrap is then sold in the United States at the U. S. ceiling price which is considerably lower than the cost of getting it down here, according to Mr. Williamson.

More Restrictions on Reclaim

Further tightening of the use of reclaimed rubber has been decreed by the Munitions and Supply Department, Ottawa, Ont. Alan H. Williamson, controller of supplies, has advised manufacturers that reclaimed rubber must not be used in making: non-essential footwear, soles, heels, sporting goods, toys, non-essential druggists' sundries, rubberized fabrics for the purse and bag trade and the raincoat trade, automobile topping and upholstery, quarterlining, lining for perambulators, garden hose, mats, matting, stair treads, flooring, tractor and farm implement tires and tubes, automobile parts and accessories, tube repair kits, car mats, automobile heater hose, automobile weather stripping, running board and sill mats and matting, defroster hose, battery boxes as original equipment for cars and trucks, and non-essential plumbers' supplies. Use of crude rubber in these articles was prohibited some time ago. No reclaimed rubber may be used for any purpose for which a permit has not been issued by the Controller, the Department said. Such permits will be granted for manufacturing essential products, as black staple lines of waterproof footwear, tire repair materials, and jar sealing rings, but the amount of reclaimed rubber released each manufacturer for any specific purpose will be limited.

The Wartime Prices and Trade Board, Ottawa, Ont., recently issued an order that among other things bans the use of rubber and 14 metals in an extensive list of farm equipment items. Exempt, however, is rubber for use in cream separators and pumps.

Kaufman Rubber Co., Ltd., Kitchener, Ont., has taken over the sales representation of Wragge Shoes, Ltd., for Quebec and the Maritime Provinces. Kaufman is also representing Waterloo Shoe Co., Ltd., in the Maritimes, and the O. J. Smith Shoe Co., in Quebec.

Woodstock and Northern Rubber Merge

The recently completed amalgamation of Woodstock Rubber Co., Ltd., Toronto, Ont., and Northern Rubber Co., Ltd., Guelph, Ont., is now known as Northern-Woodstock Rubber, Ltd., with main office at 60 Front St. W., Toronto. Both companies had been active in the manufacture and distribution of rubber footwear throughout Canada, with branch offices and warehouses in its principal cities.

Officers of the new company are: president, Leo J. Heit; vice president and general manager, H. J. Ross; secretary-treasurer, G. A. Clifford; directors, Mr. Heit, N. M. Lynn, D. E. Kennedy, E. S. Sargeant, and Mr. Ross; general sales manager, Mr. Lynn. Mr. Heit was formerly president of Woodstock, and Mr. Ross, its manager. Mr. Lynn previously had been general manager of the Northern firm. J. D. Bahen, formerly Montreal branch manager for Northern, holds a similar position under the new set-up. Quarters in Montreal, however, now are housed in larger premises at 427 Notre Dame St. W.

The Dominion Department of Munitions and Supply, Ottawa, Ont., in its appeal for all kinds of scrap rubber, is using a wide list of media across Canada in a campaign which started April 27, with space in English, French, and foreign-language dailies and weeklies, farm papers, and a limited list of other publications throughout the Dominion. Radio also is being utilized.

The first carload of salvaged rubber was recently loaded in Vancouver, B. C., by the Red Cross salvage service for shipment to the Fairmount Corp., Toronto, Ont., a government organized corporation.

The Department also announced that a polymerized vinyl resin is being used as a substitute for rubber in making raincoats for the Dominion's armed forces. It is applied as coating to a cotton fabric of suitable weight and strength. The new raincoats are lighter in weight than those of rubber and are said to resist light and heat better and to be unaffected by most alkalis, acids, alcohols, petroleum solvents, oils, and greases. Besides they are said not to crack at a temperature of −20° F. Civilians, however, will have to do without new raincoats, as "no crude, reclaim or synthetic rubber is available" for any such purpose.

Aluminum Co. of Canada, Ltd., on May 11 announced production of pure magnesia for the first time at Wakefield, P. Q., with the opening of the firm's new magnesia plant. F. E. Dickie, manager, stressed that magnesia is a highly important war material and is made from Canadian raw materials. He added that extensive deposits of brucite limestone in the Gatineau Valley are being used as the ore for the high-grade magnesia, which will be produced in substantial tonnage. Austria and Greece were Canada's pre-war sources for the high-grade magnesites, although Canadian magnesites had been used in making some grades of refractory materials.

FROM OUR COLUMNS

50 Years Ago—June, 1892

The milky juice of several species of *Euphorbia* solidify on exposure to the air. Some interest has of late years been attached to these juices for the purpose of mixing with rubber and gutta-percha, as well as for the manufacture of an anti-corrosive paint for ships' bottoms. (p. 270.)

The smell of India-rubber is one of the characteristics of its decomposition. When a piece of blotting paper is placed over decaying rubber it becomes colored by some of the emanations, as does not occur with good rubber. There is therefore no doubt that certain volatile substances are emitted during the oxidation that produces the hardening of India-rubber. (p. 272.)

"The year has not been without its surprises. Foremost among them comes the pneumatic tire." (p. 274.)

A rubber-man gives the following as a compound for the soles of tennis shoes: 8 pounds fine Para, 8 pounds coarse Para, 7½ pounds litharge, 1 pound lampblack, 8 ounces sulphur. (p. xix.)

Rubber substitute is comparatively little used in this country, the importation of a leading dealer being reported by him as not exceeding eight tons per year. It sells for seventeen cents per pound. (p. xix.)

25 Years Ago—June, 1917

It is perfectly possible that German patents in the United States will be cancelled. This would interest the dye people greatly. It would also interest the chemical concerns and the rubber laboratories, for it would release for manufacture many accelerators on which we pay royalty to Germans. (p. 506.)

Orders for submarine batteries have been placed by the government of the United States with several rubber mills. This is said to be seriously affecting the supply for battery dealers. These batteries are very large, and battery equipments for submarines are said to cost $50,000 apiece. (p. 516.)

Hydroflouric acid, sulphuric acid, and alum are not recommended, especially in the manufacture of sheet, where a portion of the acid or salt is retained in the rubber. (p. 519.)

Because the rubber industry is so dependent upon freedom of the seas it seems a singular coincidence that a ship in the direct London-New York service, well known for its frequent rubber cargoes, should have been the first armed American merchantman to cripple a German submarine. This distinction goes to the *Mongolia*. On April 19, the gun crew fired America's first shot in the war, and scored a clean hit at 1,000 yards, shattering the periscope.

Tire Sales Drastically Curbed in the Dominion

An estimated 1,000,000 or more Canadian motorists are prohibited from obtaining any usable automobile tires or tubes or retreading services under a drastic tire rationing announced May 14 by Munitions Minister Howe and effective May 15. The order: (1) limits for the first time the purchase of retreaded tires, used tires, used tubes, and retreading; (2) tightens the existing control over new tires and tubes; (3) determines that every tire dealer will start tomorrow [May 15] with a clean order sheet by making invalid all existing commitments or agreements for the retail sales of tires, tubes, or retreading services; (4) sets up three classes of persons eligible to buy tires, on a sliding scale based on usefulness of each vehicle to the war effort, and rules out all other motorists as ineligible to buy any usable tire or retreading services; (5) provides that no person may buy or sell, borrow or lend, give away or receive as a gift, mortgage, barter, exchange, cut, burn, destroy, or in any other way dispose of a usable tire or tube, except by the order, thus prohibiting any two or more motorists from pooling their tires to equip one of their vehicles; (6) fixes a ceiling on the prices of all usable tires and on retreading.

Under the order, no usable tires or tubes may be purchased for trucks engaged chiefly in carrying luxury goods. Except for deliveries of ice and fuel, trucks carrying commodities direct to the home will not be allowed new tires.

Hoarding of bicycle tires also is prohibited under the tire rationing order, which provides that no bicycle owner may purchase a tire unless he needs it for immediate replacement of a tire no longer serviceable. The same regulation also applies to tubes. At no time may the owner possess more than two tires and two tubes for any one bicycle.

Coincident with the announcement of new tire rationing policies, the Munitions and Supply Department of the Wartime Prices and Trade Board on May 14 described briefly the new ceiling prices which it has established on all retreaded and used tires, used tubes, and retreading and repair services. The price order fixes a maximum price of $5.40 for the 6:00x16 size of used tire if it did not require sectional repair before its sale.

The dealer may, however, charge up to $8.10 for a similar tire on which he has made one built-in and vulcanized sectional repair, or $9.70 for a tire which required two or more such repairs. The 6:00x16 used tube will sell for a maximum of $1.45. Maximum prices for retreading services have been standardized and for the most popular size of tire will cost up to $9 provided the user is supplying the tire.

LATIN AMERICA

VENEZUELA

Iván Dario Maldonado, director of agricultural economy for the government of Venezuela at Caracas, has reported that large numbers of wild *Hevea Benthamiana* and *Castilla Elastica* are available for tapping in the vast forests of the Amazonas Federal Territory and the states of Bolivar, Yaracuy, Barinas, and Zulia. Because the rubber areas have been long abandoned because of excessive costs and prices higher than for Far Eastern, Señor Maldonado said it was not possible to determine the amount of rubber that could now be obtained annually. The fluctuation in output from 1906 to 1924 is indicated in the table below.

Year	Tons	Year	Tons	Year	Tons
1906	210	1913	170	1919	186
1907	159	1914	112	1920	150
1908	216	1915	139	1921	22
1909	207	1916	138	1922	less than half a ton
1910	316	1918	36	1924	3
1912	442				

An effort will be made to obtain rubber from the forests, and labor for that purpose is available. But the capital investment required and production costs have not been announced. At present no regular freight service is available on the Orinoco and its tributaries.

The United States Department of Agriculture has supplied seedlings and high-yielding clones of *Hevea Brasiliensis* from Central American countries for planting in various localities in Venezuela. Nurseries have also been established as a first step in developing a rubber plantation industry in the country.

In Venezuela, the Government is offering 35c a pound for rubber, and as a result, Indians of the Amazonas Territory on the upper Orinoco River, are again going out to collect wild rubber, a pursuit abandoned for many years because of low prices.

COLOMBIA

The Government of Colombia is manifesting great interest in the possibilities of obtaining large quantities of rubber locally and is purchasing wild rubber at a fixed price through one of its agencies, according to the United States Department of Commerce. It is pointed out in Colombia that to secure important quantities of rubber it will be necessary to establish depots where the native gatherers can receive immediate payment.

Some former importers in Bogota whose business has been curtailed by prevailing world conditions are turning their attention to the collection of rubber for sale to the United States or for domestic manufacture. It is believed that this practice will spread to other sections of the country once purchasing depots are established.

Native gatherers will have to be taught better methods for the extraction and coagulation of the wild rubber before such an industry can become of real economic importance in the Republic.

LATIN AMERICA NOTES

Recent news from Latin America continues to reflect the revived interest in the production of rubber in these parts, an interest to no small extent due to the activities of the United States Government. However, United States firms have not been behindhand either. It may not be generally known that not only Ford, but also Firestone and Goodyear have been endeavoring to start rubber growing in suitable regions; large experimental planta-

tions have been established by Firestone in Colombia and Guatemala; while Goodyear has been active along similar lines in Colombia and Peru.

Reports from experiment stations indicate that plantations established in Sao Paulo, Brazil, are progressing favorably. It is learned that farmers are being encouraged to plant rubber among their other crops and that their interest is stimulated by the recognition of the value of rubber trees as shade for other plants and of the possibilities of the seeds from which a drying oil can be obtained while the residue is suitable for use in animal feeds and in fertilizers.

In this connection it is perhaps well to recall that the natives in Sumatra and Malaya with their small stands of rubber, grown largely as a sideline, and their usually crude methods of exploitation, in the aggregate were able to supply at low cost, but mostly at a fair profit to themselves, close to half the total Eastern output of plantation rubber.

A certain amount of rubber planting had been undertaken in the British West Indies, on the islands of Trinidad and Tobago, in the period of high rubber prices, and estimates place the existing number of trees of the *Hevea* type at roughly 150,000. In 1941, only 147,558 pounds of rubber were collected, but it is believed that with intensive tapping this could be increased to 250,000 to 300,000 pounds annually, while additional amounts could be obtained from some 80,000 *Castilloa* trees found scattered on various plantations throughout the colony. At present, however, a shortage of labor exists which would prevent maximum tapping.

In 1941 Brazil manufactured 11,635,625 kilos of rubber goods, against 6,592,269 kilos in 1940. The output included mainly tires, tubes, and rubber-insulated cables. A certain export trade to neighboring countries has developed; thus press reports state that 20,000 tires were sold to Colombia.

Although a factory to manufacture tires and tubes has been established in Cuba, this does not seem to be in production yet. In 1941 the island imported 105,602 tire casings, against 99,456 in 1940.

EUROPE

GREAT BRITAIN

Urgent Demand for More Reclaim

In view of the fact that the amount of rubber allocated to manufacturers this year will be only about 50% of that used in 1941 and will also be under strictest control, steps are being taken by the appropriate authorities to raise production of reclaim to such an extent that it will be possible to increase the former percentage of reclaim to rubber by nearly five times. But until extended manufacturing facilities are completed, reclaim is to be imported from the United States, and it is expected shortly to be able to release enough imported material to satisfy full requirement.

The London *Rubber Age*, which has for some time vigorously tackled the reclaim question, desires quicker action. It realizes that the annual pre-war capacity of reclaim plants here was less than 10,000 tons and that for various reasons the principal factories are working at only 75% capacity; whereas the immediate possible demand is up to 50,000 tons a year. Also that it would, as reliable American sources indicate, take 18 to 24 months for delivery of plant necessary for large-scale reclaiming. Therefore the magazine is sponsoring an emergency reclaim plan which, it is claimed, will produce all the reclaim the country can use within six months, provided the plan receives all co-operation from the Minister of Supply. This plan involves widespread and immediate adoption of a suitable "heater" system of reclaiming. Systems of this type are already in use in some English factories and also on the Continent; the system does not seem to require the elaborate and costly plant and equipment needed for alkali or acid

reclaim, an obvious advantage under present conditions. The emergency plan will be fully discussed serially by F. N. Pickett, in the *Rubber Age;* but since time is vital, it will also be published immediately as a book.

Federation of Rubber & Allied Manufacturers' Associations

Since the outbreak of the war it has become increasingly apparent that it is desirable for the rubber industry to have one organization in a position to speak for all branches of the industry on questions of general interest. Of course there is the India Rubber Manufacturers' Association, but even before the war it represented only part of the industry and since then its scope has been further reduced. Now a proposal is under discussion to form a Federation of British Rubber & Allied Manufacturers' Associations, and already strong support is forthcoming. Its objects are:

(a) To act on behalf of the rubber and allied industries as a central medium of communication with the government and its departments, the Federation of British Industries, and other national organizations on questions affecting the industries generally and to furnish information to and advise and assist the government and its departments and other national organizations in relation to such questions.

(b) To advise, assist, and, on request, represent members in dealings and communications with the government and its departments and other national organizations.

(c) To unify and promote the efforts of all sections of the rubber and allied industries in matters pertaining to the interest of the industries generally.

(d) To watch over the interests of the industries and to apprise members of questions arising which affect those interests.

(e) To take such action as may be deemed advisable on matters affecting the interests of the industries generally.

The Federation will not cover prices or labor relations.

British Notes

At the thirty-third annual meeting of the Rubber Growers' Association, April 23, Harold F. Copeman was elected chairman for the ensuing year; J. C. Innes, vice chairman; and the following members of council: A. C. Matthew, A. J. Austin-Dickson, R. Bannerman, N. C. S. Bosanquet, Geo. Brown, P. J. Burgess, M. C. English, James Fairbairn, R. B. Fidler, T. J. Carlyle Gifford, A. F. Goodrich, E. D. Hewan, J. W. N. Kennedy, G. H. Masefield, Sir George Maxwell, J. L. Milne, G. R. K. Mugliston, J. E. Nathan, H. R. Quartley, R. F. McNair Scott, Charles Stewart.

The Minister of Supply has issued an order by which the amount of crude rubber, and zinc oxide that may be used in compounds for soles and heels, and the specific gravity of the compound, are controlled. In addition the maximum thicknesses for soles and heels, according to sizes, are also fixed.

The following prices per pound will be paid by the Ministry of Supply for rubber which must be shipped not later than two months after the date of the relative contracts: Nigeria, first sheet, 12¾d.; second sheet, 12¼d.; third sheet, 11¾d.; ball, lumps, flakes, and scraps, 9½d.; Gold Coast, Para, and Funtumia sheets, 11d.; Uganda, Tanganyika, Nyasaland, Northern Rhodesia, and Kenya plantation sheet 12½d. (All prices f.o.b.) Gold Coast, first sheet, 11d.; second sheet, 10½d.; third sheet, 10d.; ball, lumps, flakes, and scraps, 7¾d. In the ordinary way, the Ministry pays to growers 11d. per lb. f.o.b., and the fixed price to consumers is 1s. 1¾d. per lb.

Only vehicles vital to the war effort will in future be supplied with new tires, and only athorized tire depots will be permitted to sell tires. Dealers not authorized must close their business and surrender their stock for cash. Retreading will be permitted only to licensed retreaders. When a consumer purchases a tire—second-hand, retreaded, or new—he must surrender his old tire without payment.

The Ministry of Supply has announced the appointment of Sir George Beharrell as director general of controls in the Ministry. Sir George is also chairman of the Rubber Control Board formed in December, 1941. The other members of this Board are: L. W. Farrow, deputy chairman; Sir Walrond Sinclair, who will be especially concerned with the United States; J. L. Milne, W. G. Essex, Rupert S. Thompson, and J. Bennett.

FRANCE

The former subsidiary plant of The B. F. Goodrich Co., in Colombes, a suburb of Paris, is reported to have been bombed on April 30 during a raid by the R. A. F. over occupied France, and left in flames. Before the plant was seized by the Nazis, it employed 3,000 persons and produced mainly tires, tubes, and mechanical rubber goods. After the fall of France, the shortage of rubber and other necessary raw materials forced curtailment of output to 25% capacity.

Also as a result of the shortage of raw materials, the French are said to be using a German method of making flexible shoe soles by mixing sawdust, waste rubber, and various synthetic substances.

SWEDEN

Samples of a synthetic rubber made from calcium carbide in the laboratories of the Uppsala University along original lines under the direction of Professor Svedberg, head of the Physical-Chemical Institute of that university and winner of the Nobel Prize for Chemistry in 1926, were displayed by the professor at a recent meeting of the Swedish Chemical Industries Board. Miniature synthetic rubber boots, the first finished products from Professor Svedberg's laboratory, were presented to three cabinet members.

It could not be learned whether and to what extent it would be possible to produce the new rubber for home consumption.

HOLLAND

The Official German News Agency states that synthetic rubber is now being manufactured by the State Coal Mines of the Province of Limburg, Holland.

FAR EAST

NETHERLANDS INDIA

At a meeting of the Malang Agricultural Association at Malang, Java, about a year ago, P. J. S. Cramer discussed the work done on rubber at the Cultuurtuin (Culture Garden) Buitenzorg during its 65 years, having been started in 1876, the same year in which the Royal Botanical Gardens at Kew, England, sent to Ceylon and Malaya some thousands of plants developed from the *Hevea brasiliensis* seeds gathered by Henry Wickham in Brazil. Kew sent a few young plants also to Java, where two were planted in the Cultuurtuin in 1877. The oldest *Hevea* trees in Java (if the Japanese have left them standing) are therefore about 65 years old now; in 1941 the circumferences of the trees at one meter from the ground were 2.29 and 4.29 meters, respectively; one was still in good shape, but the other had had to be patched by the tree surgeon. Neither tree ever gave high yields.

In 1882 the Cultuurtuin received 35 seeds gathered from Wickham trees planted in Penang, Malaya; 33 trees were produced, which by 1900 yielded abundant seed, part of which was used for other plantings in the Cultuurtuin, and part went to estates. Drastic selective thinning-out eventually reduced the number of these trees to eight; in 1941, when they were 58 years old, none of them yet showed signs of decay. The circumferences varied from 2.22 meters at one meter above the ground to 3.16 meters. In later years new planting material was repeatedly imported from South America, among others, seeds from the Cultuurtuin in Paramaribo, Dutch Guiana, which were obtained from trees grown from seed that came directly from Para; and also seed which Dr. Cramer himself had collected in the Amazon territory in 1913; but none of these imports produced such high-yielding trees as the original Wickham seed.

Probably the first attempts to bud *Hevea* were undertaken at the Cultuurtuin; for many years the garden boasted a budding left over from tests made in 1915; the garden also has one of the oldest budded areas, planted out on February 18, 1918. This area deserves special attention for two reasons, said Dr. Cramer. First, it convincingly disproves the contentions of those who maintain that budded *Hevea* cannot be long-lived because vegetative propagation leads to degeneration; for there was, in 1941 at least, no sign of senility among the 23-year-old bud-grafts. In the second place, there the possibility of successfully rebudding mature trees was demonstrated; for it happened that when tapping was eventually begun here, evidence was found that a number of the trees were not the off-spring of the clones from which they were supposed to have been derived, but were false buddings. Hence it was decided to rebud these trees with the true clone at one meter above the ground, which budding was successfully done.

During 1923-1927 the Cultuurtuin also experimented with other types of *Hevea*, as *H. guyanensis*, *H. Spruceana*, and *H. collina*. *H. guyanensis* and *H. collina* are related varieties, belonging to the same section (*Euhevea*); the former is a native of Dutch Guiana, but is also found growing in the Amazon territory; *H. collina* has been found in the regions south of Santarem, in Brazil. Both varieties seem to thrive in poor, sandy soils; they are similar in appearance, and both have highly colored latex—bright yellow to orange—but the seeds differ in shape. *H. Spruceana* is an entirely different kind of tree, belonging to the *Bisiphonia* section, of which *H. brasiliensis* is also a member; it is very common everywhere along the Amazon and the lower courses of its tributaries where Dr. Cramer saw it growing on mud banks entirely under water and on the frequently flooded marshy strips of land bordering the river banks.

These varieties are in themselves not important as producers of rubber since yields are small and the rubber of poor quality, especially that of *H. Spruceana*, but the hybrids of these varieties and *H. brasiliensis* are very promising; these are well-developed, vigorously growing trees and, in addition, the *collina* and *guyanensis* hybrids also have strong leathery leaves. Early tests at the Cultuurtuin proved that *H. brasiliensis* could easily be budded on stocks of *Spruceana* hybrid; the buddings showed exceptionally vigorous growth, but the yield was rather less than on *H. bra-*

siliensis stock. This work led to the carrying out of similar experiments at the AVROS experimental gardens in Sumatra, where better results were achieved, especially in the case of clone Av. 50 budded on *Spruceana*. Not only were the stems and branches much thicker than of comparable bud-grafts of the clone on *brasiliensis* stock, but yields were also considerably higher.

In one respect, however, *Spruceana* proved disappointing; it had been hoped that this variety, which grows luxuriantly in the marshes along the Amazon, might be resistant to dangerous root diseases, but small scale-trials in the Cultuurtuin revealed no difference in favor of *Spruceana* in this regard, although both budded and unbudded *Spruceana* grew well on the marshy soil selected for the test.

The three special varieties under discussion are not only valuable for raising hybrids and stock for bud-grafts, but also as aids in studying the processes taking place in bud-grafts, for instance the effect of scion on stock and *vice versa*. Dr. Cramer mentioned an unusual experiment made at the Cultuurtuin in the 1923-1927 period, when a *brasiliensis* seedling was used as stock for a *collina* bud, which in turn was again grafted with a *brasiliensis* bud about one meter from the ground. The tree was later tapped so that the cut passed over the place of union, and, said Dr. Cramer, it was remarkable to see how one-half produced the orange latex of *collina* and the other the white *Hevea brasiliensis* latex. A reversal of this test had been planned—in which a *brasiliensis* bud was to be grafted on to a *guyanensis* stock and then the *brasiliensis* section again grafted with a *guyanensis* bud so that the *brasiliensis* would form a connecting piece between stock and top of *guyanensis*. The Japanese seizure has put an end to this kind of work—at least for the time being.

INDIA

Press reports from Calcutta indicate that increased production of rubber-soled brown canvas shoes to meet the growing needs of the defense service is under consideration. It seems that output could be raised to 1,000,000 pairs a month, a quantity deemed sufficient to cover all presently known requirements for 1942-43.

Waste Wood in Construction Material

Excelite, a plastics-like construction material, is made from wood wool "excelsior" combined with water, a small amount of silicate of soda, soybean protein, and quicklime. The manufacturing process is reported to be the first known one to unite a major proportion of natural ligno-cellulose fiber with a smaller amount of thermo-setting plastic, according to Charles H. Oppenheimer, president of Designers for Industry, Inc., which licenses the rights to use the material. Excelite may be pressed into sheets or molded in any density from four to 50 pounds per cubic foot in any form for which a mold is made. It can be produced in any thickness from $\frac{1}{16}$-inch to six inches, and is said to be strong, tough, resilient, fire resistant, and to have a low heat conductivity. It is further claimed that the material can be sawn, planed, and nailed, and will not swell, warp, bulge, or check. Suggested applications are: insulating building boards, refrigerator insulation, stove-pipe board liners, air ducts, sash molding, roofing, containers, cabinets, doors, furniture, veneer cores, truck and bus bodies, and many other objects now made of metals or plastics. Possible military uses are also being considered. Because Excelite is made of materials easy to obtain even with present shortages, the material is expected to alleviate problems of manufacturers who cannot get priorities materials.

Output of bentonite in 1941, according to the United States Bureau of Mines, was 354,028 short tons, 41% above the 1940 production of 251,032 tons. The value of the 1941 shipments was $2,451,900, against $1,919,461 in 1940. Of the 1941 tonnage, 60% was the swelling, or Black Hills, type mined principally in South Dakota, Wyoming, and California. The nation-wide average price of $6.93 per ton f.o.b. mines in 1941 was a marked reduction from the $7.65 average in the preceding year.

Editor's Book Table

BOOK REVIEWS

"The Electron Microscope." By E. F. Burton and W. H. Kohl. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. 1942. Cloth, 6 by 9¼ inches. 233 pages. Bibliography, illustrations, index. Price $3.85.

The first chapters of this concise volume are devoted to a discussion of the general principles and theories of light and associated phenomena which provide a broad base of understanding for the subsequent description of electrostatic and magnetic lenses and their utilization in electron microscopy. The development of the theory and the successive experiments which led to the construction in 1938 of the first electron microscope are summarized, and the essential structural features of both the electrostatic and magnetic types are described.

The last chapter suggests the extensive commercial, biological, and medical applications of this modern tool for research. Manufacturers of carbon black, fillers, clay, and other products will find the electron microscope of increasing importance in studying the structure of materials, and this book may prove helpful as a general treatise on this revealer of minute things. There are plates showing the distribution of particles of carbon black, zinc oxide, clay, polymerized polyvinyl chloride and other specimens.

"Chemical Dictionary." Compiled by F. H. Campbell. Published by Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. 1942. Cloth, 8¾ by 5¾ inches, 85 pages. Price $2.50.

About 1,000 commonly used words and terms are defined in the first American edition of this condensed dictionary of essential chemical information for students, chemists, and chemical engineers. Words usually defined in textbooks have been omitted as well as those the compiler thought potential users of the book to be familiar with. Some of the terms are not strictly chemical ones, but were included as helpful to chemists who more than occasionally require the value of physical and other units. Many Latin, Greek, French, and German roots, suffixes, and prefixes are defined for a clearer understanding of the component parts of words.

A section on organic nomenclature has been summarized from rules approved by an international committee, and a valency table is included as a source of ready reference.

This is by no means an exhaustive compendium, but its exactitude of definition, compact size, and low price are qualities that will meet with some approval in laboratory and chemical industry.

"Behold My Brother." George Rosensteel. Published by the House of Field, Inc., 19 W. 44th St., New York, N. Y. 1941. Cloth, 8¼ by 5¼ inches. 382 pages. Price $2.50.

This first novel by an Akron rubber worker covers five years of labor strife in a fictional rubber manufacturing center which has little similarity to Akron. Although the author has drawn generously on autobiographical material, the book is in no sense a literal history of labor conditions or union growth in any particular industrial city. The theme is the regeneration of men through brotherhood, and the medium of its development is the exploitation of workers by unscrupulous union leaders and organizers eager for undisputed power. The author relates the callous and brutal consequences of walkouts, sitdowns, fights, riots, and sabotage on a group of rubber workers and their families in the struggle of two unions to gain representative dominance in an industry.

Mr. Rosensteel has not made the most of his material, and his dialogue and narration of action is less than facile. Climactic situations are developed in a melodramatic way which shadow their force and effect. The narrative adds nothing to previously documented material on current labor problems in the rubber industry, but its background and story, though offering no striking parallels to actual events, may be of some interest to persons associated with the industry.

"The Development of American Industries." Revised Edition. Edited by John George Glover and William Bouck Cornell. Prentice Hall, Inc., 70 Fifth Ave., New York, N. Y. 1941. Cloth, 6 by 9¼ inches, 1005 pages. Illustrated. Tables and charts. Indexed. Price $5.50.

The material brought together in this volume, prepared and written by specialists in 39 industries including rubber, provides a readable and useful history of industrial economy in the United States. Each chapter surveys the growth, the raw materials used, manufacturing and marketing methods, important products, employment, and possible future developments of an industry. Social and economic factors during the past ten years and the effects of legislation are explained. Changes in production methods are discussed and new products described.

The informative chapter, "The Rubber Industry", written by A. L. Viles, president of The Rubber Manufacturers Association, Inc., broadly surveys all important phases of the subject. The geographical location of the manufacturing industry is discussed with emphasis upon the recent tendency toward decentralization for economy in distribution. Methods of rubber manufacture are briefly described, and the marketing of tires, boots and shoes, druggists' sundries, mechanical goods, rubber flooring, rubberized fabrics, and heels and soles outlined. A chart of the organization of a typical rubber company and the 1937 Census of Manufactures showing production units and sales value by types of rubber products are valuable aids to the author's discussion. Mr. Viles gives the total estimated world-wide investment of American rubber companies as $1,250,000,000 and suggests that developments having possibilities for increased future production are foamed rubber, parts for motor vehicles and aircraft, and pneumatic tires for farm equipment.

NEW PUBLICATIONS

"Laboratory Reports on Various Grades of Spheron in Highly Loaded Stocks." Godfrey L. Cabot, Inc., Boston, Mass. 7 pages. This mimeographed release is a condensed résumé of five studies on the effects of various grades of Spheron at high loadings in both high-grade stocks and all-reclaim stocks. Based on the physical test data obtained, suggestions are made for the selecting of the proper carbon black type for compounds of increased tensile strength, elongation, abrasion resistance, hardness, and electrical conductivity. For electrical conductivity, Spheron N, a special type carbon black, is mentioned.

"The Royle Forum." No. 18. Edited by S. M. Ferrer. John Royle & Son, Paterson, N. J. 8 pages. This folder describes and illustrates the many uses of extruded rubber products in transportation, communications, construction, mining and quarrying, and other applications.

"Plastics Digest." Vol. 1, No. 1. Jan., 1942. Plastics Publishing Co., P. O. Box 523, New Brunswick, N. J. 39 pages. This abstracting periodical in the fields of plastics and synthetic rubber covers United States, Canadian, and foreign developments. The various departments include abstracts of general and patent literature in chemistry, research, testing, analysis, and technology; news; trade literature; and new applications.

"Perbunan Compounding and Processing." Chemical Products Department, Stanco Distributors, Inc., 26 Broadway, New York, N. Y. 36 pages. This looseleaf manual discusses the specific properties and the compounding and processing of Perbunan (Buna-N). Tabular data shows the compared results of standard tests with reference to the efficiency of various softeners, pigments, and accelerators in Perbunan recipes. A section on product compounding gives recipes for various purposes and test results of them. The properties of mixtures of Perbunan and natural rubber, and Perbunan and polyvinyl chloride are also summarized.

"Compounding of Buna S." R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8 pages. This report presents the material upon which was based the address of A. A. Somerville at the meeting of the Detroit Rubber & Plastics Group, Inc., May 8. It covers laboratory work and observations on the processing, general compounding, loading, and vulcanization of Buna S. Data on percentage of permanent set, tear resistance, impact resilience, shore hardness, stress-strain, tensile, and other properties are shown in comparison with those of natural rubber compounds. Conclusions based on the tests are briefly summarized.

"Guayule." The General Tire & Rubber Co., Akron, O. 16 pages. This illustrated booklet describes the development of guayule cultivation in Mexico and California during the past 50 years. The extraction process, de-resination, and the McCallum and Spence cultivation methods are also discussed.

"Surgical Dressings. Their Manufacture and Uses." Johnson & Johnson, New Brunswick, N. J. 80 pages. The manufacture and use of several types of surgical dressings are explained in this illustrated booklet, which also contains much general information pertinent to the subject. The making of adhesive plaster, including the thorough preparation of the virgin rubber, is briefly told in a series of drawings and accompanying text.

"Federal Price Control." Office of Price Administration. United States Government Printing Office. Washington, D. C. 127 pages. Price 20¢. This indexed and cross-indexed digest summarizes all public announcements made by the OPA and its predecessors between July 1, 1940, and February 10, 1942. The subject matter is grouped by commodities and lists price schedules, "freeze letters," appointments, and addresses by OPA officials. Listings include guayule, rubber and rubber products, tires and tubes, camelback, carbon black and other compounding ingredients, cotton gray goods, textiles, and other critical materials. A digest of the subject of the announcement is given for each issuance together with the date and code number of the press release.

"Standardization Activities of National Technical and Trade Organizations." Robert A. Martino. National Bureau of Standards, United States Department of Commerce. United States Government Printing Office, Washington, D. C. Index. 288 pages. 75c. The activities and accomplishments of 450 organizations in which standardization is an important function is outlined in this book which presents the material in alphabetical form under the names of the various associations and societies. Information on standardization of rubber surgeon's gloves, mechanical goods, sheeting, tires, cables, other products, and rubber scrap is included, and the work of the A.S.T.M. and three other general standardizing agencies is summarized. An inclusive bibliography on standardization, and the activities of the National Bureau of Standards and the Procurement Division, Treasury Department, are given in appendices.

"Effect of Reenforcing Pigments on Rubber Hydrocarbons." F. S. Thornhill and W. R. Smith, of Godfrey L. Cabot, Inc., Boston, Mass. Reprinted from *Industrial and Engineering Chemistry*, Vol. 34, page 218, February, 1942. 12 pages. This study surprisingly discloses that, while the anticipated loss in unsaturation of the rubber hydrocarbon was noted in vulcanized stocks containing non-reenforcing fillers, no such loss in unsaturation could be detected in rubber compounds containing reenforcing channel blacks. The authors suggest that this alteration in sulphur vulcanization may be chiefly responsible for the physical characteristics of reenforced rubber stocks.

"Performance of Rubber Insulation of Building Wire in One-Year Oven Tests." Bulletin of Research, No. 25. March, 1942. Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill. 24 pages. This bulletin describes and reports results of physical, accelerated aging, and oven tests of several new types of rubber insulation for building wire to determine their performance under field conditions, compared with a type previously approved by the National Electrical Code.

"Surgical Trade Buyer's Guide. 1942." Surgical Business, Inc., 369 Lexington Ave., New York, N. Y. 100 loose-leaf pages. Price $1. The third issue of the guide contains more listings than previous editions and has been thoroughly revised to insure accuracy and completeness. The directory of the sources of supply is divided into a surgical and an orthopedic section and includes manufacturers of dressings, instruments, ampoule medications, various kinds of equipment, accessories, and appliances. The listings and manufacturers' advertisements suggest the varied uses of rubber in surgery and orthopedics.

"More Production, Better Morale." The Bedaux Co., Inc., 405 Lexington Ave., New York, N. Y. 16 pages. In this pamphlet the Bedaux Co. suggests its industrial engineering service as a means of increasing individual plant efficiency in the production of war materials.

"Will America Have to Jack up Its 29,000,000 Automobiles?" John L. Collyer. The B. F. Goodrich Co., Akron, O. 46 pages. **"Priorities Instructions."** Army and Navy Munitions Board, Washington, D. C. 32 pages. **"Management Strategy in Collective Bargaining."** Staff of *Executive's Labor Letter*. National Foremen's Institute, Inc., Deep River, Conn. 7 pages. $1. **"Self-Rating Scale for Leadership Qualifications."** Eugene J. Benge. National Foremen's Institute. 6 pages. 25c. **"Robertson Reminders."** Vol. 10, No. 2. John Robertson Co., Inc., 121-35 Water St., Brooklyn, N. Y. 12 pages. **"Safety Equipment."** Mine Safety Appliances Co., Pittsburgh, Pa. 8 pages. **"Explanation of Principles for Determination of Costs under Government Contracts."** War & Navy Departments. United States Government Printing Office, Washington, D. C. 26 pages. 10c. Press Releases of the Division of Information, Office for Emergency Management, Washington, D. C.: **"The Geography of Rubber"; "The Truth about Rubber"; "Where Our Rubber is Going"; "Our Double Need for Rubber"; "How to Save Rubber—And Why."**

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Manuring Under War Conditions. L. A. Whelan, Rubber Research Scheme (Ceylon) "Fourth Quarterly Circular, 1940", Dec., 1940, pp. 267-71.

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Program of Manuring for Replanted Rubber Clearings. Rubber Research Scheme (Ceylon), "Advisory Circular No. 2", Revised Oct., 1941, pp. 1-3.

Technical Questions on the Preparation of Rubber. F. T. Bokma, *Bergcultures*, Jan. 17, 1942, pp. 48-59.

Sulphuric Acid as Coagulent. H. A. Leniger, *Bergcultures*, Jan. 17, 1942, pp. 62-65.

(*Continued on page 306*)

Patents and Trade Marks

APPLICATION

United States

2,273,044. **Writing Implement Support** Comprising a Tapered Elastic Sleeve Portion of Rubber to Provide a Brace for the First Joint of the Digit. H. J. Johnson, Boston, Mass.

2,273,059. **Golf Ball Driving Mat** for Automatic Teeing Machines, Comprising a Metallic Frame, a Sponge Rubber Cushion Resting upon It, and a Metal Plate upon the Cushion. J. Mozel, Portland, Oreg.

2,273,128. **Water Bag.** P. S. Madsen, Bethany, and A. A. Arnold, Hamden, assignors, by mesne assignments, to Seamless Rubber Co., New Haven, all in Conn.

2,273,129. **Bearing Seal** Having Resilient Packing Rings Free to Accommodate the Eccentric Movements of a Rotating Element While Closely Hugging It. W. Messinger, Philadelphia, Pa.

2,273,182. **Window Sealing Stripping.** H. M. Dodge, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O.

2,273,184. **Ice Cube Can** with Resilient Member Separating One Grid from Another and Being Separable from the Grids. T. S. Elliott, Sr., Norfolk, Va., assignor to Victor Products Corp., Hagerstown, Md.

2,273,211. **Tubular Coupling** with Resilient Gripping Ring. E. F. Martinet, assignor to P. A. Geier Co., both of Cleveland, O.

2,273,308. **Journal Box** with a Resilient Cushioning Ring. O. W. Young, Maplewood, N. J., assignor to General Motors Corp., Detroit, Mich.

2,273,379. **Locking Means** for Bearing Rings Including an Annular Rubber Ring. R. R. Searles, assignor to Fafnir Bearing Co., both of New Britain, Conn.

2,273,380. **Anti-Friction Bearing Seal** of Yielding Material. R. R. Searles, assignor to Fafnir Bearing Co., both of New Britain, Conn.

2,273,393. **Wire-Sheathed, Heat-Shielded Flexible Hose.** N. M. Couty, Detroit, Mich., assignor to Flex-O-Tube Co., a corporation of Del.

2,273,395. **Universal Tubing Fitting** with Resilient Annular Washer. N. M. Couty, Detroit, Mich., assignor to Flex-O-Tube Co., a corporation of Del.

2,273,396-2,273,397. **Swivel Hose Fitting.** N. M. Couty, Detroit, Mich., assignor to Flex-O-Tube Co., a corporation of Del.

2,273,398. **Coupling** for Reenforced Flexible Hose Having an Outer Layer of Rubber, Neoprene, or the Like over the Reenforcement. N. M. Couty and W. F. Corley, both of Detroit, Mich., assignors to Flex-O-Tube Co., a corporation of Del.

2,273,415. **Rod Assembly** with Resilient Bearing Block. J. M. Nickelsen, Ann Arbor, assignor to Monroe Auto Equipment Co., Monroe, both in Mich.

2,273,425. **Chewing Gum Material** Comprising Ethyl Cellulose and a Gum Selected from the Group Consisting of Resins, Rubbers, and Chicle. W. S. Traylor, Newport, assignor to Hercules Powder Co., Wilmington, both in Del.

2,273,457. **Safety Tube.** C. H. Zimmerman, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,273,466. **Laminated Structure** Having Plies of Elastoplastic Film. R. P. Dinsmore, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,273,470. **Method of Lining Cartons** Utilizing Heat-Sealable Film. C. E. Gardner, Cuyahoga Falls, O., assignor to Wingfoot Corp., Wilmington, Del.

2,273,480. **Drain Plug** Having a Resilient Ring. G. Yates, Glendale, Calif.

2,273,491. **Business Machine** with Resilient Cushioning Pads. H. A. Leedy, assignor to Felt & Tarrant Mfg. Co., both of Chicago, Ill.

2,273,505. **Container** with Inlet and Outlet Pipes and a Shallow Circular Hollow Body Portion of Rubber. R. R. Florian, Monroe, Mich.

2,273,659. **Resurfacing the Tire Tread** of a Resilient Railway Wheel Having Rubber-Like Elements Separating the Tire Plates from the Hub Plates. E. H. Piron, New York, N. Y., assignor to Transit Research Corp., a corporation of N. Y.

2,273,669. **Sectional Inking Roller** for Printing Presses. R. L. Stumpf, assignor of one-half to L. J. Stumpf, both of Springfield, O.

2,273,693. **Resilient Valve Disk** in a Valve Assembly. J. B. Burks, Houston, assignor of one-third to M. B. Taylor, Harris County, both in Texas.

2,273,727. **Condiment Container.** B. R. Rowen, Flint, Mich., and E. H. Trump, Barberton, O., assignors to Ward Plastic & Rubber Co., Detroit, Mich.

2,273,733. **Seal** for Double-Walled Glass Units Comprising a Concentrated Latex Paste and a Dehydrating Powder Mixed in Predetermined Portions. O. H. Paddock, Rossford, assignor to Libbey-Owens-Ford Glass Co., Toledo, both in O.

2,273,794. **Piston Packing** Including an Elastic Piston Ring. L. Harel, Barcelona, Spain.

2,273,817. **Windshield Cleaner** Having a Plurality of Wiper Elements. W. J. Chellew, assignor to Trico Products Corp., both of Buffalo, N. Y.

2,273,833. **Decorative Upholstery Panel** Having a Strip of Soft, Cured Rubber Secured to a Backing Panel. C. E. Carpenter, assignor to National Automotive Fibres, Inc., both of Detroit, Mich.

2,273,837. **Detachable Connector** for Coupling a Tube or Hose to a Faucet or Valve. B. D. Davies, Jamaica, N. Y.

2,273,867. **Bottle Closure Shell** with Cushion Liner. C. S. Jackson, assignor to Peters Bros. Rubber Co., Inc., both of Brooklyn, N. Y.

2,273,869. **Resilient Support.** M. F. A. Julien, Paris, France.

2,273,873. **Adhesive Surgical Dressing** Having a Coating of Pressure-Sensitive Adhesive on Both Sides of a Transparent Tape and an Incompatible Protective Separator Sheet Secured to One Exposed Coating. E. F. Klein, assignor to Raritan Bay Holding Co., a partnership composed of E. F. Klein and C. Yates, all of Perth Amboy, N. J.

2,273,962. **Machinery Packing** Having a Flexible Sealing Element. C. R. Hubbard, assignor to Garlock Packing Co., both of Palmyra, N. Y.

2,273,976-2,273,977. **Vulcanized Water - Tight Rubber Joint** between a Shoe Sole and Upper. B. V. Mitchell, Jamaica, N. Y.

2,274,002. **Paint Brush.** A. L. Saltzman, Orange, assignor to Rubberset Co., Newark, both in N. J.

2,274,118. **Multi-Cell Battery Filling Head** Having Nozzles with Resilient Seals Adapted to Close the Filler Openings and Support the Frame on the Battery. F. Altmayer, assignor to Willard Storage Battery Co., both of Cleveland, O.

2,274,136. **Continuous Wall Outlet Construction** Comprising Parallel Bus Bars, a Hollow Duct Having a Solid Wall and a Slotted Wall Connected at Their Edges by Portions against Which Are Disposed the Bus Bars, the Duct Providing Continuous Insulating Shields for the Facing Surfaces of the Bus Bars, Normally Shielding the Bus Bars and Formed to Be Pierced by the Ends of the Connector Contact Fingers as These Are Inserted into the Duct Slot and Twisted 90° to Engage the Bus Bars. W. H. Frank and A. S. Bassette, assignors to Bulldog Electric Products Co., all of Detroit, O.

2,274,202. **Foundation Garment.** S. G. Jones, Chicago, Ill.

2,274,231. **Battery Separator** Comprising a Continuous Rubber Phase Having Substantially Continuous Communicating Pockets Containing Particles of Silica Gel Smaller in Size Than the Pockets to Provide a Continuous Porosity Due to Voids in the Rubber and Porosity of the Particles. A. S. Behrman, assignor to A. S. Behrman, trustee of Porous Rubber Products Trust, Chicago, Ill.

2,274,246. **Hollow Rubber Head** for Decoy Ducks. F. P. Riddell, Milwaukee, Wis.

2,274,257. **Connector** Comprising a Hollow Resilient Body. E. L. Rockwood, Toledo, O., assignor to G. D. Davis, South Orange, N. J.

2,274,277. **Windshield Wiper Blade.** R. E. Rousseau and H. W. Clum, assignors to Trico Products Corp., all of Buffalo, N. Y.

2,274,323. **Resilient Sealing Gasket** for Pipe Sections. H. P. Fisher, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O.

2,274,324. **Resilient Sealing Gasket** Adapted to be Collapsed around Spaced Surfaces. H. P. Fisher, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O.

2,274,398. **Attachment Plug** with Yieldable Body. T. J. Conrad, El Segundo, Calif.

2,274,468. **Floor Covering** Comprising a Flexible Backing Sheet of Woven Fabric and a Plurality of Elongated Thick Rib Members, Including a Rubber Body and Short Non-Metallic Cords, Disposed in Spaced Side by Side Relation on the Sheet. H. W. Bell, Akron, O., assignor to Durable Mat Co., Seattle, Wash.

2,274,472. **Railway Car End Construction.** H. D. Breen and A. F. O'Connor, assignors to Union Asbestos & Rubber Co., all of Chicago, Ill.

2,274,511. **Drinking Fountain Attachment** for Faucets with an Elastic Water-Impervious Rubber Body. A. Van D. Worthington, Oakland, Calif.

2,274,515. **Endless Rubber Composition V-Belt.** C. W. Yelm, assignor to Gates Rubber Co., both of Denver, Colo.

2,274,650. **Valve Actuating Mechanism** Having a Plurality of Yieldable, but Incompressible Rubber Washers. O. H. Banker, Chicago, Ill.

2,274,652. **Suspenders.** H. J. Bayon, Angers, France.

2,274,700 and 2,274,701. **Screening Apparatus** with Spaced Metallic Screens and a Soft Rubber Spacing Pad therebetween. C. E. Jenks, Willoughby, assignor to W. S. Tyler Co., Cleveland, both in O.

Dominion of Canada

402,730. **Girdle.** A. Larocque, Montreal, P. Q.

402,765. **Imitation Astrakhan** with Latex Impregnated Backing Member. Concord Chenille Co., Inc., assignee of A. Unger, both of New New York, N. Y., U. S. A.

402,791. **Decorative Upholstery Panel** Having a Strip of Soft, Cured Rubber Secured to It. National Automotive Fibres, Inc., assignee of C. E. Carpenter, both of Detroit, Mich., U. S. A.

402,792. **Decorated Material** Comprising a Rear Ply of Relatively Thick Low-Grade Rubberous Material, a Ply of Fabric, and a Facing Ply of Relatively Thin Rubberous Material of High Quality. National Automotive Fibres, Inc., assignee of G. R. Cunnington, both of Detroit, Mich., U. S. A.

402,826. **Fire Repellent Pile Fabric.** United States Rubber Co., New York, N. Y., U. S. A., assignee of Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. A. Gibbons, Montclair, N. J., U. S. A.

402,844. **Engine Mounting** Comprising a Multiple Series of Rubber Bushings. Lord Mfg. Co., assignee of Lord Mfg. Co. (a partnership), both of Erie, Pa., assignee of W. E. Stitz, Dayton, O., all in the U. S. A.

402,845. **Adhesive Tape** Having a Coating Comprising a Coating of Nitrocellulose Superimposed on a Coating of Rosin and Rubber. Minnesota Mining & Mfg. Co., assignee of R. G. Drew, both of St. Paul, Minn., U. S. A.

402,862. **Tire** with Rubber Tread on a Flexible Rim. J. V. Martin, Hempstead Township, N. Y., U. S. A.

402,863. **Tennis Racket** with a Resilient Cushion Member at Either Edge of the Throat and Extending Edgewise along the Frame. H. Matte, Ottawa, Ont.

402,883. **Electrolytic Sugar Reducing Apparatus** with a Cellular Rubber Protecting Substance Floating on the Whole Upper Surface of the Catholyte during the Reduction to Prevent Air from Coming into Contact with the Catholyte. Atlas Powder Co., Wilmington, Del., assignee of K. R. Brown, Tamaqua, Pa., both in the U. S. A.

402,891. **Electric Attachment Cap** Having a Rubber Casing Adapted to Form a Strain Relief for the Cord Wires. Canadian General Electric Co., Ltd., Toronto, Ont., assignee of G. B. Benander, Yalesville, Conn., U. S. A.

402,904. **Electric Cable.** Canadian General Electric Co., Ltd., Toronto, Ont., assignee of H. J. Stewart, York, Pa., U. S. A.

402,917. **Air Bag Stem.** Dill Mfg. Co., Cleveland, assignee of J. C. Crowley, Cleveland Heights, both in O., U. S. A.

402,925. **Respirator.** General Tire & Rubber Co., assignee of H. T. Kraft, both of Akron, O., U. S. A.

402,958. **Shaving Brush.** Rubberset Co., assignee of B. Buddish, both of Newark, N. J., U. S. A.

402,970. **Refrigerator Car Wall,** with Flexible Sheet Insulation Affixed thereto. Union Asbestos & Rubber Co., assignee of J. S. Lundvall, both of Chicago, Ill., U. S. A.

403,030. **Sponge Rubber Beading Strip.** Bridgeport Fabrics, Inc., assignee of L. Spraragen, both of Bridgeport, Conn., U. S. A.

403,031. **Artificial Leather** Comprising a Waterlaid Felted Cellulose Fiber Base Impregnated throughout with the Dried Residue of a Mixture of Rubber Latex and Chemically Homogenized Starch Solution. Brown Co., assignee of M. O. Schur and E. M. Archer, co-inventors, all of Berlin, N. H., U. S. A.

403,067. **Striped Elastic Fabric.** Columbia Narrow Fabric Co., assignee of N. E. Randall, both of Shannock, R. I., U. S. A.

403,097. **Multi-Pane Glazing Unit** with Marginal Sealing Strip of Plastic Composition and Rubber Spacer Blocks. Robert Mitchell Co., Ltd., assignee of H. M. Woelfel, both of Montreal, P. Q.

403,144. **Bathinette.** D. M. and B. H. Kennedy, co-inventors, both of Rochester, N. Y., U. S. A.

403,153. **Tire Repair Plug.** P. E. Hawkinson, Minneapolis, Minn., U. S. A.

403,157. **Weather Strip** Comprising Narrow Sponge Rubber Strips Adhesively Secured to One Face of a Metal Strip. H. R. Lyon, Winnipeg, Man., Canada.

403,164. **Atomizer** with Resilient Compressible Member. W. H. Rose, Jersey City, N. J., U. S. A.

403,169. **Pile Strip Mat Manufacture** Utilizing Rubber Impregnated Fabric. W. Weiner, Forest Hills, N. Y., U. S. A.

403,222. **Resilient Railway Wheel** with Spring Element of Ring Shape Comprising a Plurality of Sector Shaped Segments of Rubber, Each Surface Bonded at Opposite Faces to Thin Metallic Plates. Firestone Tire & Rubber Co., assignee of C. Saurer, both of Akron, O., U. S. A.

403,223. **Cushioned Seat Construction.** Firestone Tire & Rubber Co., assignee of E. F. Riesing and G. V. Soper, all of Akron, O., and A. E.

Rathbun, Somerset, Mass., co-inventors, all in the U. S. A.

403,257. **Mattress** Comprising an Inner Spring, a Layer of Material upon the Spring, a Porous Cellular Layer of Rubber Supported by the Material, and Cellulosic Padding. Stearns & Foster Co., Lockland, assignee of W. G. Schubert, Cincinnati, both in O., U. S. A.

403,261. **Wiper Blade** Adapted to Be Mounted for Flopping Movement about an Axis. Trico Products Corp., Buffalo, assignee of E. C. Horton, Hamburg, and A. Rappl, Buffalo, co-inventors, all in N. Y., U. S. A.

403,262. **Windshield Wiper** of the Squeegee Type. Trico Products Corp., Buffalo, assignee of E. C. Horton, Hamburg, and A. Rappl, Buffalo, co-inventors, all in N. Y., U. S. A.

403,287. **Traction Device** for Resilient Tired Vehicles. C. P. Galanot, Alliance, O., and J. A. Watson, Jr., Silver Spring, Md., co-inventors, both in the U. S. A.

403,301. **Bathing Cap.** T. J. Howland, Long Branch, N. J., U. S. A.

403,307. **Foundation Garment.** P. H. Robbins, New York, N. Y., U. S. A.

403,358. **Shock Absorber** with Flexible Cup-Shaped Packing Ring. Gabriel Co., Cleveland, assignee of E. L. Beecher, Cleveland Heights, both in O., U. S. A.

403,493. **Railway Car Brake** with Insert of Rubber. Chicago Railway Equipment Co., assignee of A. C. Moore, both of Chicago, Ill., U. S. A.

403,500. **Window Sash** with Glazing Strip of Elastic Resilient Compressible Material. O. M. Edwards Co., Inc., assignee of E. F. Chaffee, both of Syracuse, N. Y., U. S. A.

403,521. **Composition for Speeding up the Making of Pigment Pastes,** Comprising a Solution of Xylol-Soluble High Molecular Weight Polymers (Natural and Synthetic Rubbers) and a Wetting Agent. Nuodex Products of Canada, Ltd., Toronto, Ont., assignee of Nuodex Products Co., Inc., Elizabeth, assignee of L. Roon, South Orange, and A. Minich, East Orange, co-inventors, all in N. J., U. S. A.

403,538. **Side Bearing** with Spaced Inclined Walls and Compressed Rubber Positioned between All the Walls for Resiliently Resisting a Longitudinal Movement of the Cap with Respect to the Housing. Symington-Gould Corp., Rochester, assignee of H. G. Swan, East Aurora, and F. G. Suckow, Bowmanville, co-inventors, all in N. Y., U. S. A.

United Kingdom

543,320. **Container.** Wingfoot Corp.

543,492. **Anti-Sound and Anti-Vibration Supports for Machines, Etc.** T. B. Andre Rubber Co., Ltd., and R. D. French.

543,511. **Vibration Insulators.** Firestone Tire & Rubber Co., Ltd.

543,533. **Windshield Wiper.** Trico Products Corp.

543,635. **Windscreen Wiper.** M. S. Slattery and D. R. Robertson.

543,696. **Windscreen Wiper.** Trico Products Corp.

543,818. **Windshield Wiper.** Trico Products Corp.

543,823. **Electric Heating Pads.** United States Rubber Co.

543,824. **Windshield Wiper.** Trico Products Corp.

543,827. **Bottle Covers.** Wingfoot Corp.

543,837. **Vehicle Suspensions.** Firestone Tire & Rubber Co., Ltd.

543,859. **Vehicle Suspension.** Firestone Tire & Rubber Co., Ltd.

543,917. **Resilient Mountings for Machines and Instruments.** Metalastik, Ltd., and M. Goldschmidt.

543,932. **Flanged Hose.** Wingfoot Corp.

543,939. **Resilient Suspensions for Vehicles.** Dunlop Rubber Co., Ltd., and J. C. Hickman.

543,996. **Fuel Tanks and Other Liquid Containers.** Ioco Rubber & Waterproofing Co., Ltd., and A. Ryan.

PROCESS

United States

22,080. (Reissue.) **Producing a Composite Strip, of Which to Form Sidewall and Tread of a Tire.** A. C. Bowers, Akron, O., assignor to Pennsylvania Rubber Co., a corporation of Pa.

2,276,387. **Printing Wax-Coated Rubber Hydrochloride Wrappers.** I. Gurwick, assignor to Shellmar Products Co., both of Mount Vernon, O.

2,276,415. **Producing Coated Fabrics** by Applying to a Fabric a Coating of Plaster of Paris Dust, Applying an Aqueous Suspension of Rubber, Then Washing off a Part of the Aqueous Suspension with the Same Suspension, But Diluted with Water So That in the Finished Product the Fibers Are Covered with Only a Thin Rubber Film Leaving the Mesh Open. A. E. Murray, Wilmington, Del.

2,276,438. **Treating a Molded Transmission Belt after Vulcanization** to Remove Surface Crust and Increase the Flexibility of the Belt. W. H. Van Buren, Akron, and P. W. Van Orden, Cuyahoga Falls, both in O., assignors to B. F. Goodrich Co., New York, N. Y.

2,277,520. **Coated Abrasives,** of Which the Coated Surface Comprises Areas Coated with Single Abrasive Grains Interspersed with Areas Coated with a Plurality of Grains. H. C. Martin and C. W. Foss, assignors, by mesne assignments, to Carborundum Co., all of Niagara Falls, N. Y.

2,277,527. **Producing Fast Dyeings on Vulcanized Fiber and the Dyed Fiber Obtained Thereby.** J. Nüsslein, Frankfurt a.M., and W. Kirst, Königstein in Taunus, both in Germany, assignors to General Aniline & Film Corp., a corporation of Del.

2,277,602. **Endless Wound Clutch Facing.** I. J. Novak, Trumbull, assignor to Raybestos-Manhattan, Inc., Bridgeport, both in Conn.

2,277,763. **Battery Paste Retainers.** A. W. Keen, Packanack Lake, N. J., assignor, by mesne assignments, to United States Rubber Co., New York, N. Y.

2,278,345. **Applying Polyvinyl Chloride to Metal Surfaces** by Adhering a Woven Fibrous Fabric with a Rough Surface to the Metal with Water Glass, Drying, and Then Depositing from Solution a Plurality of Layers of Polyvinyl Chloride. D. G. Benson, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,278,355. **Forming Vulcanized Rubber Thread Wound Centers for Golf Balls.** W. E. Reichard, assignor to Worthington Ball Co., both of Elyria, O.

2,278,424. **Hollow Cylindrical Textile Roll Cover Having an Outer Member of Resilient Synthetic Rubber-Like Material.** C. H. Campbell, assignor to Sonoco Products Co., both of Hartsville, S. C.

2,278,441. **Making Porous Rubber by the Addition of Butane to Latex.** M. M. Harrison and L. P. Gould, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,278,551. **Making a Ball Center** by Inserting through an Inwardly Tapering Opening of a Hollow Elastic Sphere a Fluid Filled Flexible Container to Fill the Cavity, and Inserting into the Sphere Opening a Plug of Elastic Material and Uniting It with the Sphere Body. F. S. Martin, Providence, R. I., assignor to United States Rubber Co., New York, N. Y.

2,278,756. **Forming an Angle or Corner of a Resilient Tubular Cavity Gasket for Refrigerator Doors** without Impairing the Resiliency of the Gasket at the Corner. W. A. Wright, Wabash, Inc., assignor to General Tire & Rubber Co., Akron, O.

2,278,826. **Preparing a Non-Staining Reclaimed Rubber Composition** by Admixing Vulcanized Rubber, an Adsorbent Material, and a Water-Insoluble Soap and thereafter Reclaiming the Rubber by Heating the Mixture in the Presence of an Alkali. A. D. Castello, Cuyahoga Falls, and H. L. Dixon, Akron, both in O., assignors to B. F. Goodrich Co., New York, N. Y.

2,278,943. **Rubber-Like Binding Agent for Fiber Substances.** C. E. W. Oesterreich, Berlin-Wilmersdorf, Germany.

2,279,047. **Alkali Digestion Process of Reclaiming Fiber-Containing Vulcanized Rubber Scrap** to Produce Directly in One Operation in Shortened Time, a Softened Cellulose-Free Reclaim. W. G. Kirby and L. E. Steinle, both of Naugatuck, Conn., assignors to United States Rubber Co., New York, N. Y.

2,279,300. **Splicing Rubber Thread.** J. F. Cavanagh, Providence, R. I.

2,279,604. **Producing Copying Paper** by Coating One Side of the Paper with an Aqueous Dispersion of Latex and Then Coating the Other Side with an Aqueous Dispersion of Latex and a Coloring Substance Free from a Precipitating Action upon the Latex. R. Wälti, Basel, Switzerland.

2,279,860. **Improving the Wetting Characteristics of a Rubber Surface** by Applying to the Surface a Solution Containing Rosin Dissolved in a Volatile Solvent and Then Evaporating the Solvent. R. A. Crawford, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,279,901. **Formation of Plastic Sheets as Interlayers for Laminated Glass** Which Comprises Introducing an Unsheeted Mass of Polyvinyl Partial Acetal Resin in Combination with a Plasticizer in the Bight of a Pair of Heated Rollers, at Least One of Which Has a Frosted or Matte Finish, and Forming a Sheet therefrom. D. Domizi, Parma, O., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,280,259. **Cutting Articles from Blanks Having Rubber Latex Coatings thereon.** R. W. Polley, assignor to Nashua Gummed & Coated Paper Co., both of Nashua, N. H.

2,280,314. **Inflatable Balls Provided with a Surface Depression of Irregular Shape.** M. Scudder, Clayton, Mo., assignor to Rawlings Mfg. Co., St. Louis, Mo.

2,280,636. **Forming Hollow, Tubular Rubber Articles from Latex.** H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.

2,280,711. **Method of Baking or Vulcanizing India Rubber Containing Vulcanizing Ingredients Having Different Dielectric Constants from Pure Rubber,** Comprising Placing the Mass to Be Treated as a Dielectric between Spaced Metallic Elements Forming the Electrodes of an Electric Condenser, and Supplying an Alternating Current Having at Least a Periodicity of the Order of a Million Cycles per Second to the Elements. R. Dufour, Paris, and H. A. Leduc, Asnieres, both in France.

2,281,336. **Recovery of Rubber from Rubber-Bearing Plants** by Subjecting the Plant to about 5,000 to 100,000 Pounds' Pressure per Lineal Inch of Width of the Matter to Express and Separate Rubber therefrom in a Fluid Fraction by a Single Application of the Pressure. M. J. Stacom, Flushing, assignor to Stacom Process Corp., Long Island City, both in N. Y.

2,281,341. **Making a Seat Structure** by Forming a Plurality of Spring Wires into Seat and Back Form, Laying Sheet Material over a Form Having a Similar Contour, Arranging the Wires on the Sheet Material and Clamping the Ends in Position, Overlying the Wires with Unvulcanized Rubber and Vulcanizing the Rubber, Wires, and Sheet Material Layer together, and Then Securing the Vulcanized Structure So That It Is Free from the Frame. J. Turner, Contoocook, N. H.

2,281,976. **Splicing Rubber Sheets.** M. E. Hansen, assignor to American Anode, Inc., both of Akron, O.

2,282,004. **Forming a Tail Cable** by Impregnating a Length of Cable with Polymerizable Material, Applying to One End a Barrier of Polymerizable Material, Polymerizing, and Carrying the Polymerization of the Barrier to a Higher Degree Than That on the Remainder of the Cable. T. R. Scott and J. K. Webb, both of London, England, assignors to International Standard Electric Corp., New York, N. Y.

Dominion of Canada

403,630. **Heater Process of Producing a Neutral Cellulose-Type Rubber Reclaim.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. G. Kirby, Naugatuck, Conn., U. S. A.

403,631. **Hard Rubber Battery Plate Separators Having Ribbed or Corrugated Self-Reenforcements.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. A. Gibbons, Montclair, N. J., U. S. A.

403,683. **Molding Flexible Printing Plates in a Matrix** by Forming a Grid from a Mesh Fabric by Varnishing to Set the Meshes of the Fabric, Applying to the Grid a Layer of the Curing Rubber Composition, Placing the Assembly on the Matrix, Applying Heat and Pressure to Force the Rubber through the Grid and into the Matrix Depressions, and Curing the Composition. Union Carbide & Carbon Corp., assignee of Bakelite Corp., both of New York, N. Y., assignee of H. Swan, Upper Montclair, N. J., both in the U. S. A.

403,990. **Packing Member for Stuffing Boxes** Comprising a Body Portion of Rubber-Impregnated Fibrous Material and a Tip Portion of Pure Molded Rubber-Like Composition. Ronald Trist & Co., Ltd., Slough, Buckingham, assignee of T. L. Wakley, London, both in England.

404,317. **Insulated Electrical Conductor** Comprising a Conductive Core, an Insulating Layer of Rubber Compound Having Its Surface Impregnated with Paraffin, and a Second Layer of Rubber Adheringly United to the Treated Surface. Western Electric Co., Inc., New York, N. Y., assignee of A. N. Gray, Baltimore, Md., both in the U. S. A.

404,329. **Treating a Multiply Belt or Sheet of Rubber** So As to Be Longitudinally Stretchable and Transversely Non-Stretchable. International Latex Processes, Ltd., St. Peter's Port, Channel Islands, assignee of T. G. Hawley, Jr., Naugatuck, Conn., U. S. A.

404,373. **Preparation of Bubble-Free Solid Resinous Polyvinyl Articles.** Dow Chemical Co., assignee of D. L. Gibb and R. D. Freeman, co-inventors, all of Midland, Mich., U. S. A.

404,434. **Slip Retarding Shoe Sole.** United States Rubber Co., New York, N. Y., assignee of P. A. Sperry, New Haven, Conn., both in the U. S. A.

MACHINERY

2,275,612. **Perforating Apparatus and Method.** F. J. Chandler, Toledo, O.

2,275,811. **Apparatus to Form Multipane Glazing Units with Plastic Extrusion Means.** H. M. Woelfel, assignor to Robert Mitchell Co., Ltd., both of Montreal, P. Q., Canada.

2,276,327. **Device for Rolling Bead Edges on Rubber Articles.** W. J. Bauer, assignor, by mesne assignments, to M. Melamid, both of New York, N. Y.

2,276,380. **Apparatus to Mold Rubber Composition Plugs on Electric Blasting Initiator Leg**

Wires. M. H. English, Pompton Lakes, N. J., and R. R. Nydegger, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,276,687. **Tread Rolling Apparatus.** A. B. Cleveland, C. H. Bernhardt, and E. G. Haag, all of Los Angeles, and A. W. Douglas, Lynwood, both in Calif.; Bernhardt, Douglas, and Haag, assignors to Cleveland.

2,277,374. **Form for Deposited Rubber Articles.** A. N. Spänel, Dover, Del.

2,277,677. **Machine for Winding Elastic under Tension to Form Golf Balls.** B. Bogoslawsky, New York, N. Y.

2,277,769. **Footwear Last.** F. J. MacDonald, Brookline, Mass., assignor to B. F. Goodrich Co., New York, N. Y.

2,278,533. **Tire Bead Wire Wrapper.** C. H. Desautels, Springfield, Mass., assignor to United States Rubber Co., New York, N. Y.

2,278,602. **Apparatus and Method for Preparing and Manipulating Rubber Stock.** G. F. Wikle, Detroit, Mich., assignor to United States Rubber Co., New York, N. Y.

2,278,764. **Apparatus and Method for Dip-Forming a Multi-Pocketed Rubber Tray.** R. S. Boyle, Akron, O.

2,279,299. **Rubber Thread Splicer.** J. F. Cavanagh, Providence, R. I.

2,279,540. **Tire Vulcanizing Press.** W. P. Voth and C. B. Hudson, assignors to Akron Standard Mold Co., all of Akron, O.

2,280,401. **Tire Recapper.** C. W. Fryckstrom and V. A. Nelson, both of Portland, Ore.

2,280,430. **Means to Remove a Tire from the Surrounding Matrix of a Horizontal Vulcanizing Mold.** E. A. Glynn, Lodi, Calif., assignor to Super Mold Corp. of California, a corporation of Calif.

2,280,883. **Apparatus for Cutting Strips from Rubber Hose.** J. Bach, Budapest, Hungary.

2,282,023. **Electrolytic Apparatus for Forming Tire Molds.** J. W. Bishop, Detroit, and A. W. Bull, Grosse Pointe, both in Michigan, assignors, by mesne assignments, to United States Rubber Co., New York, N. Y.

Dominion of Canada

403,504. **Vulcanizing Apparatus** Comprising a Vulcanizer, a Circulatory System of Low Pressure Steam, a Primary Superheater, a Secondary Superheater and Means for Feeding Superheated Air or Steam into an Article in the Vulcanizer. Firestone Tire & Rubber Co., assignee of G. P. Bosomworth, both of Akron, O., U. S. A.

403,505. **Tire Vulcanizing Mold.** Firestone Tire & Rubber Co., assignee of G. P. Bosomworth, both of Akron, O., U. S. A.

CHEMICAL

United States

2,273,880. **Moistureproof Sheet Wrapping Material** Obtained by Coating Regenerated Cellulose Sheet with the Butadiene Drying Polymer Obtained by Heating a Mixture of Butadiene, Benzene, n-Butyraldehyde, and a Catalyst (Equal Parts of Copper Acetate/H_2O, Copper Metal, Iron Powder, Ferrous Oxide). J. A. Mitchell, Kenmore, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,275,856. **Preparation of Rutile Titanium Dioxide.** Comprising Heating Anatase Titanium Dioxide with an Admixture of Zinc Oxide and Magnesium Oxide between above 840 and 1100° C. E. Lederle, Ludwigshafen, and R. Brill, Heidelberg, both in Germany.

2,276,520. **Production of Insulation and Rubber Goods** Including Rubber, Sulphur, Zinc Oxide, Diphenylguanidine, and a Filler (Dark Residue of Distilled Shale Ground to Fine Powder and Composed of Water, Oil, Carbon, Iron Oxide, and Silica). C. J. Stapelfeld, Torrance, assignor of 7/8ths to D. G. Bachtold, Long Beach, and 1/8th to M. I. Church, Whittier, all in Calif.

2,276,840. **Polymer of an N-Vinylimide of an Aromatic Dicarboxylic Acid** Having Its Two Carboxyl Groups on Adjacent Ring Carbons. W. E. Hanford and H. B. Stevenson, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,276,893. **Preparing Viscous to Solid Linear Hydrocarbon Polymers** by the Polymerization of Low Molecular Weight Iso-Olefin and Low Molecular Weight Conjugated Diolefin Reactants with a Friedel-Craft Halide Catalyst, Comprising Dispersing the Catalyst in an Organic Liquid Having a Freezing Point Substantially Below —10°C., Atomizing the Liquid and Dispersing the Particles into the Iso-Olefin and Diolefin Reactants Maintained at a Reaction Temperature of —10°C. R. M. Thomas, Union, and I. E. Lightbown, Elizabeth, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,276,932. **Inhibiting the Deterioration of Rubber** by Treating It with a Compound Having the General Formula A—X Where *X* Is the Ring Nitrogen Atom of a 2,5-Dialkyl Pyrrol Group, and *A* Is an Aliphatic Group Containing a Plurality of Open-Chain Carbon Atoms, with One Carbon Atom Directly Attached to the Ring Nitrogen Atom. C. Coleman, Montclair, N. J., assignor to United States Rubber Co., New York, N. Y.

2,276,951. **Article Composed of Polymerized Isobutylene Having a Surface Coating of Chlorinated Polyisobutylene.** H. W. Fisher, Cranford, N. J., assignor to Standard Oil Development Co.

2,276,986. **Producing an Improved Latex** by Removing Salts from a Natural Latex Until the Natural Ash Content Does Not Exceed 0.15% of the Total Solids of the Latex and Reducing the pH of the Latex to below about 3.5. A. R. Kemp, Westwood, N. J., and W. G. Straitiff, Kew Gardens, assignors to Bell Telephone Laboratories, Inc., New York, both in N. Y.

2,277,083. **Process Which Comprises Treating, at 20-150°C., a Hydroxylated Polyvinyl Resin with 0.1-10%, Based on the Weight of the Resin, of an Aliphatic Di-Isocyanate.** G. L. Dorough, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,277,259. **Plastic Polyvinyl Alcohol Compositions.** E. Schnabel, Berlin-Lichterfelde, Germany, and C. Dangelmajer, Dover, N. J., assignors to Resistoflex Corp., New York, N. Y.

2,277,504. **Purification of Vinylidene Chloride Polymers.** R. M. Wiley, assignor to Dow Chemical Co., both of Midland, Mich.

2,277,650. **Producing N-Butylene from Tertiary Butyl Chloride and Mixtures of Iso-Butylene and Hydrogen Chloride in the Presence of a Solid Catalyst.** M. Mueller-Cunradi, Ludwigshafen-on-the-Rhine, and A. Cantzler and H. Krekeler, Mannheim, both in Germany, assignors, by mesne assignments, to General Aniline & Film Corp., New York, N. Y.

2,278,046. **Preserving Rubber** by Treating It with a Reaction Product of Carboxylic Acid with a Condensation Product of a Ketone and a Primary Aromatic Amine in an Amount at Least Sufficient to Combine with the Basic Constituents of the Ketone-Amine. R. L. Sibley, Nitro, W. Va., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,278,127. **Polysulphide Polymeric Plastic** Comprising a Substance Which Is Substantially a Polymer of the Unit

$$\left\{-C_2H_4.O.C_2H_4-S_2 \text{ to } 6-\right\}$$

Where *S* Is a Sulphur Atom Incorporated with a Polymerized Butadiene. J. C. Patrick, Morrisville, Pa., assignor to Thiokol Corp., Trenton, N. J.

2,278,128. **Desulphurized Polysulphide Polymer.** J. C. Patrick, Morrisville, Pa., assignor to Thiokol Corp., Trenton, N. J.

2,278,231. **Plasticized Polyvinyl Chloride Filaments, Sheets, Etc.** J. G. E. Wright, Alplaus, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,278,355. **Improving the Adhesion of Rubber to Natural and Synthetic Organic Fibers** by Treating the Fiber with an Azo Aromatic Compound, Associating the Fibers with Rubber, and Vulcanizing the Rubber. E. T. Lessig, and I. Gazdik, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,278,368. **Organic Polysulphide Plastic Produced from Polysulphide and a Halogenated Compound** (Bromoparaffin, Chloroparaffin, or Pentabrompentane) and Showing High Strength and Resistance to Organic Solvents. W. Frost, assignor to the Firm Silesia Verein Chemischer Fabriken, both of Saarau, Kreis, Schweidnitz, Germany.

2,278,415. **Interpolymers of Unsymmetrical Dichloroethylene.** H. W. Arnold, assignor to E. I. duPont de Nemours & Co., Inc., both of Wilmington, Del.

2,278,539. **Process Which Comprises Incorporating in a Vulcanizable Rubber Stock an Ultra Accelerator of Vulcanization and a Chemical Having the Formula**

$$R-C(=O)-NH-X$$

Where *R* Is a Member of the Group Consisting of Aryl and Heterocyclic Radicals, and *X* Is Chlorine. P. M. Elliott, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,278,558. **Preserving Rubber by Incorporating Therein a Methallyloxy Diarylamine.** P. T. Paul, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,278,559. **A 4-Methallyloxy Diarylamine.** P. T. Paul, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,278,777. **Adhering Plasticized Gamma Polyvinyl Chloride to a Copolymer of Butadiene and an Unsaturated Nitrile.** B. S. Garvey and D. E. Henderson, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,278,783. **Preparation of Polyvinyl Formate from a Reaction Mixture of Polyvinyl Alcohol and Formic Acid.** W. O. Herrmann, Deisenhofen, and W. Haehnel, Munich, assignors to Dr. Alexander Wacker Gesellschaft fur Elektrochemische Industrie, G.m.b.H., Munich, all in Germany.

2,278,802. **Composite Product Comprising Natural Rubber and Synthetic Rubber.** D. V. Sarbach, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,278,833. **Rubber-Like Composition Containing Neoprene and Polyvinyl Chloride.** R. A. Crawford, Akron, O., assigner to B. F. Goodrich Co., New York, N. Y.

2,278,982. **Ink Roller Comprising a Body of Sulphurized Isobutylene-Butadiene Polymer Material.** P. K. Frolich, Westfield, N. J., assignor to Standard Oil Development Co., a corporation of Del.

2,279,145. **Laminated Safety Glass Having a Layer of Transparent Synthetic Resin Plastic.** J. D. Ryan, assignor to Libbey-Owens-Ford Glass Co., both of Toledo, O.

2,279,256. **Adhesive Composition Comprising an Emulsion Containing Broken-Down Rubber and a Resin** (Rosin, Copal, Manila, or Senegal). J. G. Mark, Cambridge, assignor to Dewey & Almy Chemical Co., North Cambridge, both in Mass.

2,279,293. **Copolymers of Butadienes with Unsaturated Alcohol Esters of Acrylic Acids.** A. M. Clifford, Stow, O., assignor to Wingfoot Corp., Wilmington, Del.

2,279,294. **Process Which Comprises Reacting e-Methylcyclohexylamine, N,N′-di(o-Methylcyclohexyl) Ethylene Diamine and an Ethylene Dihalide.** A. F. Hardman, Akron, O., assignor to Wingfoot Corp., Wilmington, Del.

2,279,762. **Electrical Insulating Material for Use as a Condenser Dielectric** Consisting of Polymerized Styrene and an Admixture of Powdered Particles of Lead Chloride. T. R. Scott and A. A. New, both of London, England, assignors to International Standard Electric Corp., New York, N. Y.

2,279,859. **Mold Lubricant Comprising a Carbonate Compound Capable of Being Decomposed during the Heat Molding Operation to Release Gaseous Carbon Dioxide.** R. S. Crawford, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,279,875. **Vulcanization Accelerator Consisting of the Mercaptoquinolines, Their Salts, and Diquinolyl Sulphides.** W. L. Semon, Silver Lake, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,279,973. **Stabilization of Organic Substances** (Vegetable and Animal Fats and Oils, Vitamins, Soaps, Rubber, Linear Super-Polyamides, Petroleum Hydrocarbons, Polymerized Olefins, Ethers, Refrigeration Gases, Dry-Cleaning Solvents, Castor Oil, Methyl Methacrylate Resins, Subject to Oxidative Deterioration Accelerated by a Catalytically Active Metal) by Incorporation of Hydroxamic Acid. M. A. Dietrich, Claymont, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

Dominion of Canada

402,896. **Electrical Insulation** Having Low Power Factor and Electrical Loss Factor, Comprising Plasticized Gamma Polyvinyl Chloride, a Lead Salt of a Phenol, and a Finely Divided Carbon Black. Canadian General Electric Co., Ltd., Toronto, Ont., assignee of M. M. Safford and B. W. Nordlander, both of Schenectady, and R. C. Feagin, Flushing, co-inventors, both in N. Y., U. S. A.

403,616. **Preparation of Cyano-2-Butadiene-1,3,** Which Comprises Acylating Alpha Vinyl Lactic Nitrile by Refluxing a Mixture of It with Acetic Anhydride, to Eliminate the Elements of Acetic Acid. Canadian Industries, Ltd., Montreal, P. Q., assignee of A. S. Carter and F. W. Johnson, co-inventors, both of Wilmington, Del., U. S. A.

403,617. **Polymer Formed by Polymerizing a Mixture of Cyano-2-Butadiene-1,3 and Chloro-2-Butadiene-1,3.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. S. Carter and F. W. Johnson, co-inventors, both of Wilmington, Del., U. S. A.

403,622. **Vulcanizing Rubber** by Incorporating into a Rubber Mix, Prior to Vulcanization, a Small Proportion of a Salt of Hexamethylene Dithiocarbamic Acid. Canadian Industries, Ltd., Montreal, P. Q., assignee of I. Williams, Borger, Tex., U. S. A.

403,635. **Transparent, Self-Sustaining Film** Comprising Polyvinyl Alcohol, a Resinous Polymeric Amino Alcohol Ester of Methacrylic Acid, Modified Rosin, a Wax, and a Plasticizer. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., assignee of E. F. Izard, Kenmore, N. Y., both in the U. S. A.

403,713. **Highly Polymerized 2-Chloro-1,3-Butadiene.** Dr. Alexander Wacker Gesellschaft für Elektrochemische Industrie, G.m.b.H., Muchen, assignee of H. Berg and H. Mader, co-inventors, both of Burghausen, Oberbayern, both in Germany.

403,992. **Formation of a Rubber Conversion Product of Increased Hardness** Which Comprises Heating the Vulcanized Rubber Composition in the Presence of an Aliphatic Halide. United States Rubber Co., New York, N. Y., U. S. A., assignee of Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of H. M. Smallwood, Nutley, N. J., U. S. A.

404,133. **Polystyrene Composition Suitable for Molding.** Union Carbide & Carbon Corp., assignee of Bakelite Corp., both of New York,

(Continued on page 300)

Market Reviews

RECLAIMED RUBBER

DEMAND for reclaimed rubber in May was heavy, and continued growth in the number and volume of calls is expected. The major portion of the total output was channeled directly or indirectly into war production. More low-grade scrap is being converted into reclaim than ever before. Reclaimers' stocks of scrap are reportedly low with less than a four months' supply available. A few plants are said to have ceased making certain reclaim items, and present supplies are expected to be almost exhausted by early autumn.

Amendment No. 9 to rubber Order No. M-15-b (see pages 252, 271) covers use of scrap and reclaim in a special list of products.

Ceiling prices are quoted below.

New York Quotations

	Sp. Grav.	¢ per lb.
Auto Tire		
Black Select	1.16-1.18	6½ / 6¾
Acid	1.18-1.22	7½ / 7¾
Shoe		
Standard	1.56-1.60	7 / 7¼
Tubes		
Black	1.14-1.26	11¼ / 11½
Gray	1.15-1.26	12½ / 13¼
Red	1.15-1.32	12 / 12¼
Miscellaneous		
Mechanical blends	1.25-1.50	4½ / 5½
White	1.35-1.50	13½ / 14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

RUBBER SCRAP

DEMANDS for rubber scrap in May were reported extremely heavy. Collections improved somewhat as is the case at this season in normal years, but were considerably less than the amount regarded as desirable for present needs. It is generally believed that a large volume remains on farms, in homes, and in various odd places. To obtain all that is actually available more intensive collection is regarded as imperative. To that end dealers have offered to buy virtually everything made of rubber, including items often refused in past years. WPA has announced that it will provide labor and trucks in areas where state salvage committees have not succeeded in moving remote scrap materials.

The Scrap Rubber Institute of the National Association of Waste Material Dealers at the request of WPB is endeavoring to increase collection of all types of scrap rubber and particularly such kinds as have heretofore been little in demand. About 15,000 letters stressing the vital necessity of increasing collections have been sent to dealers throughout the country. Many inquiries have been received asking where such things as rubberized clothing, druggists' sundries, solid truck tires, tennis shoes, overshoes, cotton covered hose, rubber heels and soles, and such miscellaneous items as jar rings, fly swatters, plumbers' suction pumps, and baby carriage tires can be sold. The Institute will furnish detailed information as to how to prepare all types of rubber scrap for shipment to reclaiming centers and will assist in finding markets.

Salvage and conservation agencies of the government are making plans for a concerted scrap rubber collection drive, but no definite date for the campaign has been announced.

Prices are up for some items not under ceilings.

Consumers Buying Prices

(As of May 22, 1942)

		Prices
Inner Tubes*†		
No. 2 passenger tubes	lb.	$0.07¾ / $0.08
Red passenger tubes	lb.	.07½ / .07¾
Mixed passenger tubes	lb.	.06¾ / .07
Tires		
Pneumatic Standard*‡		
Mixed passenger tires	ton	18.00 / 19.00
Beadless passenger tires	ton	24.00 / 25.50
No. 2 light colored carcass	ton	50.00 / 52.50
No. 1 passenger peelings	ton	47.50 / 50.00
Solid Tires		
Clean mixed truck	ton	46.00 / 50.00
Light gray	ton	55.00 / 60.00
Boots and Shoes		
Boots and shoes, black	lb.	.01½ / .01⅝
Colored	lb.	.01¼ / .01⅜
Untrimmed arctics	lb.	.01¼ / .01⅜
Mechanicals		
Mixed black scrap	ton	32.00 / 35.00
Hose, air brake	ton	32.00 / 34.00
Garden, rubber covered	ton	15.00 / 20.00
Steam and water, soft	ton	15.00 / 20.00
No. 1 red	lb.	.05¼ / .05⅜
No. 2 red	lb.	.04½ / .05
White druggists' sundries	lb.	.04¾ / .05
Mixed mechanicals	lb.	.04 / .04½
White mechanicals	lb.	.04¾ / .05
Hard Rubber		
No. 1 hard rubber	lb.	.16 / .17

*Ceiling prices. Higher price refers to premiums. †East of Rockies. ‡Akron.

Fixed Government Prices*

Plantation Grades

	Price Per Lb.
No. 1-X R.S.S. in cases	$0.22½
No. 1 Thin Latex Crepe	.23 5/16
No. 2 Thick Latex Crepe	.23 5/16
No. 1 Brown Crepe	.21 3/4
No. 2 Brown Crepe	.21 5/16
No. 2 Amber	.21 3/4
No. 3 Amber	.21 5/16
Rolled Brown	.17 11/16

*For a complete list of government prices see p. 254.

The Rubber Manufacturers' Association, Inc., 444 Madison Ave., New York, N. Y., has notified us that the Rubber Questionnaire issued quarterly is no longer available for general distribution or publication; this ruling became effective with the compilation for the Fourth Quarter, 1941.

New York Market Rubber Quotations

		May 27, 1941	Apr. 22, 1942	May 22, 1942
		(Dollars and Cents)		
Latex				
Normal and concentrated (solid content)	lb.	.30/.35	.2825/.295	.2825/.29
Paras †				
Upriver fine	lb.	.37	.....	.....
Upriver fine	lb.	*.41	.....	.....
Upriver coarse	lb.	.17	.....	.....
Upriver coarse	lb.	*.27	.....	.....
Islands fine	lb.	.30	.....	.....
Islands fine	lb.	*.40	.....	.....
Acre, Bolivian fine	lb.	.38	.....	.....
Acre, Bolivian fine	lb.	*.42	.....	.....
Beni, Bolivian fine	lb.	.38	.....	.....
Madeira fine	lb.	.37	.....	.....
Caucho †				
Upper ball	lb.	.17	.....	.....
Upper ball	lb.	*.27	.....	.....
Lower ball	lb.	.16	.....	.....
Pontianak				
Pressed block	lb.	.14/.26	‡	‡
Guayule				
Ampar	lb.	.15½	.....	.....
Africans				
Rio Nuñez	lb.	.19	.20	.20
Black Kassai	lb.	.19	.20	.20
Prime Niger flake	lb.	.30	.28	.28
Gutta Percha				
Gutta Siak	lb.	.18½	‡	‡
Gutta Soh	lb.	.29	‡	‡
Red Macassar	lb.	1.20	2.75	2.75
Balata				
Block Ciudad Bolivar	lb.	.47	‡	‡
Manaos block	lb.	.50	‡	‡
Surinam sheets	lb.	.52	‡	‡
Amber	lb.	.54	‡	‡

*Washed and dried crepe. Shipments from Brazil. †These Brazilian rubbers have been taken over by the Rubber Reserve Co., and no prices have as yet been set. ‡None available at present.

Tire Production Statistics

Pneumatic Casings

	Inventory	Production	Shipments
1939	8,664,505	57,612,731	57,508,775
1940	9,126,528	59,186,423	58,774,437
1941	4,416,640	61,532,656	66,162,707
1942			
Jan.	4,550,068	1,368,787	1,231,422
Feb.	4,552,702	1,112,907	1,115,950
Mar.	4,809,123	1,156,410	1,027,021

Pneumatic Casings

	Original Equipment	Replacement Sales	Export Sales
1939	18,207,556	38,022,034	1,279,185
1940	22,252,869	35,345,656	1,175,912
1941	24,778,505	39,900,058	1,484,144
1942			
Jan.	985,010	227,347	19,065
Feb.	.....	.....	.....
Mar.	.....	.....	.....

Inner Tubes

	Inventory	Production	Shipments
1939	7,035,671	50,648,556	51,190,314
1940	7,016,948	52,237,003	52,214,079
1941	4,678,407	57,382,118	59,689,072
1942			
Jan.	4,712,113	1,327,656	1,256,609
Feb.	4,677,671	1,050,790	1,099,468
Mar.	5,025,878	1,129,259	986,228

Inner Tubes

	Original Equipment	Replacement Sales	Export Sales
1939	18,190,630	31,997,906	1,001,778
1940	22,172,452	29,069,547	972,080
1941	24,722,066	33,737,494	1,229,572
1942			
Jan.	1,030,890	212,152	18,351
Feb.	.....	.....	.....
Mar.	.....	.....	.....

Source: The Rubber Manufacturers Association, Inc.

COMPOUNDING INGREDIENTS

THE immediate necessities of rubber manufacturers for war materials production continued to be the dominant influence in supply and demand in the compounding ingredients market in May. Prices of those products not previously under ceilings are reported subject to the General Maximum Price Regulation.

CARBON BLACK. The demand continued light, but there were some indications that shipments of black during May might total slightly more than in April, when shipments were about 6,000,000 pounds less than in March.

CLAY. Movement to rubber plants declined.

FACTICE OR RUBBER SUBSTITUTE. Manufacturers reported a very heavy demand for rubber substitutes.

LITHARGE. Little change from high April levels in both offerings and demands for litharge was reported.

LITHOPONE. The call was greater than the supply. General Preference Order No. M-128, issued and effective May 6, permits the Director of Industry Operations to require a percentage of all classes of lithopone to be set aside each month. Mandatory orders will be filled from this pool. Exports of lithopone other than lend-lease cannot be made except by authority of the WPB.

RUBBER CHEMICALS. There was a fairly steady demand for antioxidants and accelerators by rubber processing plants. A slight drop in some lines was offset by a pick-up in others. Conservation Order No. M-105, issued May 6 and effective June 1, placed deliveries of naphthalene under rigid allocation control by the WPB.

RUBBER SOLVENTS. The call for rubber solvent naphthas held to good levels, with the market in a stronger position than six months ago. One firm reported heavier shipments in the first five months of 1942 than in the corresponding period of 1941. Supplies are reportedly small. Stocks of benzol to supply expanding synthetic rubber production are being accumulated.

TITANIUM PIGMENTS. Movement to the rubber industry was reported as only a small percentage of 1941 shipments, and the over-all demand was somewhat less than production.

ZINC OXIDE. The demand for zinc oxide reflected current restrictions in rubber consumption, but movements to war industries were heavy. Present supplies are reported ample to meet all demands, but offerings to consumers for civilian products were limited with sales allocated. Zinc oxide pool requirements for May were 10% of January production.

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	$0.04
Rottenstone, domestic	lb.	.025	

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	25.00	
Litharge (commercial)	lb.	.09	
Magnesia, calcined, heavy	lb.		
technical, light	lb.	.0625/	.07

Accelerators, Organic

A-1	lb.	$0.26	/$0.35
A-10	lb.	.36	/ .42
A-19	lb.	.52	/ .65
A-32	lb.	.60	/ .70
A-46	lb.	.50	/ .57
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
Accelerator 49	lb.		
808	lb.	.60	/ .62
833	lb.	1.15	
Acrin	lb.	.65	
Aldehyde ammonia	lb.	.65	/ .70
Altax	lb.	.45	
B-J-F	lb.	.40	/ .45
Beutene	lb.	.60	/ .65
Butasan	lb.	1.15	
Butyl Eight	lb.	.98	/ 1.00
C-P-B	lb.	2.00	
Captax	lb.	.40	
D-B-A	lb.	2.00	
Delac A	lb.	.40	/ .50
O	lb.	.40	/ .50
P	lb.	.40	/ .50
Di-Esterex-N	lb.	.50	/ .60
DOTG (Di-ortho-tolyguanidine)	lb.	.44	/ .46
DPG (Diphenylguanidine)	lb.	.36	
El-Sixty	lb.	.40	/ .47
Ethasan	lb.	1.15	
Ethylideneaniline	lb.	.42	/ .43
Formaldehyde P.A.C.	lb.	.06	/ .0625
Formaldehyde-para-toluidine	lb.	.65	
Formaniline	lb.	.36	/ .37
Guantal	lb.	.40	/ .50
Hepteen	lb.	.35	/ .40
Base	lb.	1.35	/ 1.50
Hexamethylenetetramine U.S.P.	lb.	.39	
Technical	lb.	.33	
Lead oleate, No. 999	lb.	.14	
Witco	lb.	.15	
Ledate	lb.	1.50	
Methasan	lb.	1.25	
Methazate	lb.	1.25	
Monex	lb.	1.55	
Morfex "33"	lb.	.68	/ .73
"55"	lb.	.97	/ 1.02
O-X-A-F	lb.	.40	/ .45
Oxynone	lb.	.77	/ .90
Para-nitroso-dimethylaniline	lb.	.85	
Pentex	lb.	.75	/ .85
Flour	lb.	.125	/ .135
O	lb.		
Flour	lb.		
Phenex	lb.	.50	/ .55
Pip-Pip	lb.	1.65	
R & H 50-D	lb.	.42	/ .43
Rotax	lb.	.50	
Safex	lb.	1.20	/ 1.30
Santocure	lb.	.60	/ .67
Selenac	lb.	2.00	
SPDX	lb.	.70	/ .75
A	lb.	.70	/ .75
Super sulphur No. 2	lb.	.14	/ .16
Tetrone A	lb.	2.20	
Thiocarbanilide	lb.	.28	/ .33
Thionex	lb.	1.55	
Thiurad	lb.	1.55	
Trimene	lb.	.55	/ .65
Base	lb.	1.05	/ 1.20
Triphenylguanidine (TPG)	lb.	.45	
Tuads, Methyl	lb.	1.55	
2-MT	lb.	.75	
Ulto	lb.	1.00	/ 1.05
Ureka	lb.	.50	/ .57
Blend B	lb.	.50	/ .57
C	lb.	.48	/ .55
Vulcanex	lb.	.42	/ .43
Z-B-X	lb.	2.50	
Zenite	lb.	.40	/ .42
A	lb.	.45	/ .47
B	lb.	.42	/ .44
Zimate, Butyl	lb.	1.15	
Ethyl	lb.	1.15	
Methyl	lb.	1.25	
Zipacel	lb.	1.65	

Activators

Aero Ac 50	lb.		
Barak	lb.	.50	
MODX	lb.	.30	/ .35
SL No. 20	lb.	.11	/ .115

Age Resisters

AgeRite Alba	lb.	2.00	
Gel	lb.	.57	/ .59
Hipar	lb.	.65	/ .67
Powder	lb.	.52	/ .54
Resin	lb.	.52	/ .54
D	lb.	.52	/ .54
White	lb.	1.25	/ 1.40
Albasan	lb.	.70	/ .75
Aminox	lb.	.52	/ .61
Antox	lb.	.56	
Betanox	lb.	.52	/ .61
B-L-E	lb.	$0.52	/$0.61
Powder	lb.	.65	/ .74
B-X-A	lb.	.52	/ .61
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.52	/ .65
White	lb.	.90	/ 1.15
M-U-F	lb.	1.50	
Neozone (standard)	lb.	.63	
A	lb.	.52	/ .54
C	lb.	.52	/ .54
D	lb.	.52	/ .54
E	lb.	.63	
Oxynone	lb.	.77	/ .90
Permalux	lb.	1.20	
Santoflex B	lb.	.52	/ .65
BX	lb.	.58	/ .71
Santovar A	lb.	1.15	/ 1.40
Stabilite	lb.	.52	/ .54
Alba	lb.	.70	/ .75
Thermoflex A	lb.	.65	/ .67
C	lb.	.58	/ .60
Tysonite	lb.	.16	/ .165
V-G-B	lb.	.52	/ .61

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 lbs.	2.70	/ 3.55
liquid, 50%	100 lbs.	1.95	
solid (700-*lb. drums*)	100 lbs.	2.30	/ 3.15

Antiscorch Materials

Antiscorch T	lb.	.90	
Cumar RH	lb.	.105	
E-S-E-N	lb.	.35	/ .40
R-17 Resin (*drums*)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.45	/ .48
U-T-B	lb.	.35	/ .40

Antisun Materials

Heliozone	lb.	.23	/ .24
S.C.R.	lb.	.33	/ .35
Sunproof	lb.	.23	/ .28
Jr.	lb.	.165	/ .215

Blowing Agents

Ammonium Carbonate, lumps (500-*lb. drums*)	lb.		
Unicel	lb.	.50	

Brake Lining Saturant

B.R.T. No. 3	lb.	.0175/	.0185

Colors

Black

Du Pont powder	lb.	.42	
Lampblack (commercial), *l.c.l.*	lb.	.15	

Blue

Du Pont Dispersed	lb.	.35	/ 3.95
Powders	lb.	2.25	/ 3.75
Heliogen BKA	lb.		
Toners	lb.		

Brown

Mapico	lb.	.11	

Green

Chrome	lb.	.25	
oxide (*freight allowed*)	lb.	.24	
Du Pont Dispersed	lb.	.98	/ 2.85
Powders	lb.	1.00	
Guignet's (*bbls.*)	lb.	.70	
Toners	lb.		

Orange

Du Pont Dispersed	lb.	.88	/ 2.35
Powders	lb.	2.75	/ 3.05
Toners	lb.		

Orchid

Toners	lb.		

Pink

Toners	lb.		

Purple

Toners	lb.		

Red

Antimony Crimson, 15/17%	lb.		
R. M. P. No. 3	lb.	.48	
Sulphur free	lb.		
R.M.P.	lb.	.52	
Golden 15/17%	lb.		
7-A	lb.	.37	
Z-2	lb.	.25	
Cadmium, light (400-*lb. bbls.*)	lb.	.80	/ .85
Du Pont Dispersed	lb.	.93	/ 2.05
Powders	lb.	.60	/ 1.65
Iron Oxide, *l.c.l.*	lb.		
Mapico	lb.	.0975	
Rub-Er-Red (*bbls.*)	lb.	.0975	
Toners	lb.		

White

Lithopone (*bags*)	lb.	.0425/	.045
Albalith	lb.	.0425/	.045
Astrolith (50-*lb. bags*)	lb.	.0425/	.045
Azolith	lb.	.0425/	.045
Titanium Pigments			
Ray-bar	lb.	.055	/ .065
Ray-cal	lb.	.0525/	.0625
Rayox	lb.	.135	/ .165
Titanolith (50-*lb. bags*)	lb.	.056	/ .0585

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of known ingredients. Requests for information not recorded will receive prompt attention.

Titanox-A	lb.	$0.145	/$0.175
B	lb.	.0575/	.0625
30	lb.	.0575/	.0625
C	lb.	.055 /	.06
M	lb.	.0575/	.0625
RC	lb.	.055 /	.06
RC-HT	lb.	.055 /	.06
Ti-Tone	lb.		
Zopaque (50-*lb. bags*)	lb.	.145 /	.1525
Zinc Oxide			
Azo ZZZ-11	lb.	.0725/	.075
44	lb.	.0725/	.075
55	lb.	.0725/	.075
66	lb.	.095 /	.0975
French Process, Florence			
Green Seal-8	lb.	.09 /	.0925
Red Seal-9	lb.	.085 /	.0875
White Seal-7	lb.	.095 /	.0975
Kadox, Black Label-15	lb.	.0725/	.075
No. 25	lb.	.085 /	.0875
72	lb.	.0725/	.075
Red Label-17	lb.	.0725/	.075
Horse Head Special 3	lb.	.0725/	.075
XX Red-4	lb.	.0725/	.075
23	lb.	.0725/	.075
72	lb.	.0725/	.075
78	lb.	.0725/	.075
80	lb.	.0725/	.075
103	lb.	.0725/	.075
110	lb.	.0725/	.075
St. Joe (lead free)			
Black Label	lb.	.0725/	.075
Green Label	lb.	.0725/	.075
Red Label	lb.	.0725/	.075
U.S.P.	lb.	.105 /	.1075
Zinc Sulphide Pigments			
Cryptone-BA-19	lb.	.056 /	.0585
BT	lb.	.056 /	.0585
CB	lb.	.056 /	.0585
MS	lb.	.0575/	.06
ZS No. 20	lb.	.0825/	.085
86	lb.	.0825/	.085
230	lb.	.0825/	.085
800	lb.	.0825/	.085
Sunolith	lb.	.0425/	.045

Yellow

Cadmolith (cadmium yellow), (400-*lb. bbls.*)	lb.	.55 /	.60
Du Font Dispersed	lb.	1.25 /	1.85
Powders	lb.	.70 /	1.75
Mapico	lb.	.0725	
Toners	lb.		

Dispersing Agents

Bardex	lb.	.0425/	.045
Bardol	lb.	.025 /	.0275
B	lb.	.05 /	.0525
Darvan No. 1	lb.	.30 /	.34
No. 2	lb.	.30 /	.34
No. 3	lb.	.30 /	.34
Nevoll (*drums, c.l.*)	lb.	.0225	
Santomerse S	lb.	.11 /	.25

Extenders

Extendex C	lb.		
Nattolen	lb.	.15 /	.20
Vanzak	gal.	.05 /	.06

Fillers, Inert

Asbestine, *c.l.*	ton	20.00	
Asbestos Fiber	ton	15.50	/48.00
Barytes	ton	40.00	
f.o.b., St. Louis (50-*lb. paper bags*)	ton	25.55	
off color, domestic	ton	29.00	
white, domestic	ton	38.50	
Blanc fixe, dry, precip	ton	80.00	
Calcene	ton	37.50	/43.00
Infusorial earth	lb.	.0225	
Kalite No. 1	ton	26.00	
3	ton	36.00	
Kalvan	ton	100.00	
Magnesium Carbonate, *l.c.l.*	lb.	.0725	
Faradene No. 2 (*drums*)	lb.	.0525	
Pyrax A	ton	7.50	
Whiting			
Columbia Filler	ton	9.00	/14.00
Suprex White	ton	32.50	
Witco, *c.l.*	ton	8.00	

Finishes

Black-Out (surface protective)	gal.	4.50 /	5.00
Mica, *l.c.l.*	ton		
Rubber lacquer, clear	gal.	1.00 /	2.00
colored	gal.	2.00 /	3.50
Shoe varnish	gal.	1.45	
Talc	ton	25.00	

Flock

Cotton flock, dark	lb.	.09 /	.11
dyed	lb.	.40 /	.80
white	lb.	.12 /	.20
Rayon flock, colored	lb.	1.00 /	1.50
white	lb.	.75 /	1.00

Latex Compounding Ingredients

Accelerator 552	lb.	1.65	
Aerosol OT Aqueous 10%	lb.		
Antox, dispersed	lb.	.54	
Aquarex D	lb.	.75	
F	lb.	.85	
MDL Paste	lb.	.25	
Areskap No. 50	lb.	.18 /	.24
100, dry	lb.	.39 /	.51
Aresket No. 240	lb.	.16 /	.22
300, dry	lb.	.42 /	.50
Aresklene No. 375	lb.	$0.35	/$0.50
400 dry	lb.	.51 /	.65
Black No. 25, dispersed	lb.	.22 /	.40
Casein	lb.		
Collocarb	lb.	.07	
Color Pastes, dispersed	lb.	.75 /	1.10
Copper Inhibitor X-872	lb.	2.25	
Dispersex No. 15	lb.	.11 /	.12
No. 20	lb.	.08 /	.10
Factex Dispersion A	lb.	.17	
Heliozone, dispersed	lb.	.25	
MICRONEX, Colloidal	lb.	.06 /	.07
R-2 Crystals	lb.	1.55 /	1.70
S-1 (400-*lb. drums*)	lb.	.65	
Santobrite Briquettes	lb.		
Powder	lb.		
Santomerse D	lb.	.41 /	.65
S	lb.	.11 /	.25
Sodium Stearate	lb.	.40	
Stablex A	lb.	.90 /	1.10
B	lb.	.70 /	.90
C	lb.	.40 /	.50
Sulphur, dispersed	lb.	.10 /	.15
No. 2	lb.	.08 /	.12
T-1 (440-*lb. drums*)	lb.	.40	
Tepidone	lb.	.63	
Tetrone A	lb.	2.20	
Zenite Special	lb.	.47	
Zinc oxide, dispersed	lb.	.12 /	.15

Mineral Rubber

Black Diamond, *l.c.l.*	ton	25.00	/30.00
B.R.C. No. 20	lb.	.0105/	.0115
Hydrocarbon, Hard	lb.	25.00	/27.00
Parmr	ton		
Pioneer, *c.l.*	lb.	25.00	/27.00
285°-300°	ton	25.00	/27.00

Mold Lubricants

Aluminum Stearate	lb.	.21 /	.24
Aquarex D	lb.	.75	
MDL Paste	lb.	.25	
Colite	gal.	.90 /	1.15
Lubrex	lb.	.25 /	.30
Mold Paste	lb.	.12 /	.30
Rubber-Glo, conc. regular	gal.	.94 /	1.15
Type W	gal.	.99 /	1.20
Sericite	ton	65.00	
Soapstone, *l.c.l.*	ton	22.50	
Zinc Stearate	lb.	.28 /	.31

Oil Resistant

A-X-F	lb.	.82 /	.88

Reclaiming Oils

B.R.V.	lb.	.035 /	.0375
C-10	gal.	.19 /	.24
D-4	gal.	.17 /	.22
E-5	gal.	.15 /	.20
No. 1621	lb.	.021 /	.0245
S.R.O.	lb.	.02 /	.0225
Type C (for synthetic rubber)	gal.	.33 /	.38
X-159	gal.	.29	

Reenforcers

Carbon Black			
Aerfloted Arrow Specification (*bags only*)	lb.	.0355†	
Arrow Compact Granulized	lb.	.0355†	
Certified Heavy Compressed (*bags only*)	lb.	.0355†	
Spheron	lb.	.0355†	
Continental, dustless	lb.	.0355†	
"AA"	lb.		
Compressed (*bags only*)	lb.	.0355†	
Disperso	lb.	.0355†	
Dixie	lb.	.0355†	
Dixiedensed	lb.	.0355†	
66	lb.	.0355†	
Furnex	le.	.035	
Beads	lb.	.035	
Gastex	lb.	.035 /	.06
HX	lb.	.0355†	
Kosmobile	lb.	.0355†	
66	lb.	.0355†	
Kosmos	lb.	.0355†	
Dixie 20	lb.	.035†	
MICRONEX Beads	lb.	.0355†	
Mark II	lb.	.0355	
Standard	lb.	.0355	
W-5	lb.	.0355	
W-6	lb.	.0355	
P-33	lb.	.0475	
Pelletex	lb.	.035 /	.06
Thermax	lb.	.0225	
"S"	lb.	.075 /	.10
TX	lb.	.0355†	
Velvetex	lb.	.04 /	.06
"WYEX BLACK"	lb.	.0355†	
Carbonex Flakes	lb.	.03 /	.035
S	lb.	.031 /	.036
Plastic	lb.	.031 /	.0335
Clays			
Aerfloted Hi-White	ton	11.00	
LGB	ton	15.00	
Paragon (50-*lb. bags*)	ton	10.00	
Suprex (50-*lb. bags*)	ton	11.00	/23.50
Catalpo, *c.l.*	ton	30.00	
China	ton	25.00	
Crown	ton	11.00	
Dixie	ton	$11.00	
"L"	ton		
Langford	ton	8.50	
McNamee	ton	10.00	
Par	ton	11.00	
Paraforce, *c.l.*	ton	50.00	
Witco, *c.l.*	ton	10.00	
Cumar EX	lb.	.05	
MH	lb.	.065	/$0.115
V	lb.	.095 /	.125
Silene	lb.	.04 /	.045

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is $0.033 per pound. All prices are carlot.

Reodorants

Amora A	lb.		
B	lb.		
C	lb.		
D	lb.		
Curodex 19	lb.		
188	lb.		
198	lb.		
Rodo No. 0	lb.	4.00 /	4.50
10	lb.	5.00 /	5.50

Rubber Substitutes

Black	lb.	.085 /	.13
Brown	lb.	.085 /	.1375
White	lb.	.09 /	.15
Factice			
Amberex Type B	lb.	.1875	
Brown	lb.	.085 /	.1375
Fac-Cel B	lb.	.15	
C	lb.	.15	
Neophax A	lb.	.165	
B	lb.	.165	
White	lb.	.09 /	.15

Softeners and Plasticizers

B.R.T. No. 7	lb.	.02 /	.021
Bondogen	lb.	.98 /	1.05
Bunnatol (for synthetic rubber)	lb.	.40 /	.50
Burgundy pitch	lb.		
Copene Resin	lb.	.32	
Cycline oil	gal.	.14 /	.20
Dipolymer Oil	gal.	.33 /	.38
Dispersing Oil No. 10	lb.	.0375/	.04
LX-436 (*tank car*)	lb.	.027	
Nevinol	lb.	.13 /	.14
Nuba resinous pitch (*drums*)			
Grades No. 1 and No. 2	lb.	.029	
3-X	lb.	.0425	
Nypene Resin	lb.	.32	
Palm oil (Witco), *c.l.*	lb.		
Palmalene	lb.	.15 /	.25
Palmol	lb.	.16	
Para Flux (reg.)	gal.	.17 /	.18
No. 2016	gal.	.135 /	.19
Para Lube	lb.	.046 /	.048
Paradene No. 1 (*drums*)	lb.	.0525	
Special (*drums*)			
20 to 35° C. M.P.	lb.	.0625	
35 to 45° C. M.P.	lb.	.0625	
45 to 75° C. M.P.	lb.	.0575	
Piccolyte Resins	lb.	.15 /	.185
Piccoumaron Resins	lb.	.045 /	.15
Pine tar	gal.		
Oil	gal.		
Plastogen	lb.	.0775/	.08
Plastone	lb.	.27 /	.30
R-19 Resin (*drums*)	lb.	.1075	
21 Resin (*drums*)	lb.	.1075	
Reogen	lb.	.115 /	.12
RPA No. 2	lb.	.65	
3	lb.	.46	
4	lb.	.80	
Tackol	lb.	.085 /	.18
Tonox	lb.	.52 /	.61
Witco No. 20, *l.c.l.*	gal.	.20	
X-1 resinous oil (*tank car*)	lb.	.011	

Softeners for Hard Rubber Compounding

Resin C Pitch 45°C. M.P.	lb.	.015 /	.016
60°C. M.P.	lb.	.015 /	.016
75°C. M.P.	lb.	.015 /	.016

Solvents

Beta-Trichlorethane	lb.	.20	
Carbon Bisulphide	lb.		
Tetrachloride	gal.		
Cosol No. 1	gal.	.26	
No. 2	gal.	.25	
No. 3	gal.	.22	
Industrial 90% benzol (*tank car*)	gal.	.15	
Picco	gal.	.22 /	.32
Skellysolve	gal.		

Stabilizers for Cure

Barium Stearate	lb.	.29 /	.32
Calcium Stearate	lb.	.26 /	.27
Laurex (*bags*)	lb.	.15 /	.175
Lead Stearate	lb.		
Magnesium Stearate	lb.	.29 /	.32
Stearex B	lb.	.1525/	.1625
Beads	lb.	.147 /	.157
Stearic acid, single pressed	lb.	.1525/	.1625
Stearite, *c.l.*	lb.	.1470	
Zinc Laurate	lb.	.29 /	.32
Stearate	lb.	.29 /	.31

Synthetic Rubber

Neoprene Latex Type 56	lb.	.30	
57	lb.	.30	
60	lb.	.36	

Neoprene Type CG	lb.	.70	
E	lb.	.65	
FR	lb.	.75	
G	lb.	.70	
GN	lb.	.65	
I	lb.	.70	
KN	lb.	.75	
M	lb.	.65	
Synthetic 100	lb.	.41	
"Thiokol" Type "A"	lb.	.35	
"FA"	lb.	.50	
"RD"	lb.	.70	

Tackifier

B.R.H. No. 2	lb.	.02	/ .021
LX-433 (*tank car*)	lb.	.068	
P.H.O. (*drums*)	lb.	.24	

Vulcanizing Ingredients

Magnesia, light (for neoprene)	lb.	.26	
Sulphur	100 lbs.		
Chloride (*drums*)	lb.	.04	
Telloy	lb.	1.75	
Vandex	lb.	1.75	
(See also Colors—Antimony)			

Waxes

736 (clear)	gal.	1.25	
737 (black)	gal.	1.35	
1515-A (black)	gal.	1.35	
Carnauba, No. 3 chalky	lb.		
2 N.C.	lb.		
3 N.C.	lb.		
1 Yellow	lb.		
2	lb.		
Carnube	lb.	.46	/ .56
Monten	lb.	.12	/ .17
Rubber Wax No. 118, Neutral	gal.	.91	/ 1.46
Colors	gal.	1.01	/ 1.56

CHEMICAL

(*Continued from page 294*)

N. Y., assignee of I. Allen, Jr., Bloomfield, N. J., both in the U. S. A.

404,157. **Butadiene Polymerizing Process.** I. G. Farbenindustrie A.G., Frankfurt a.M., assignee of G. Ebert, R. Heidebroek, and P. Orth, co-inventors, all of Ludwigshafen-on-Rhine, both in Germany.

United Kingdom

543,288. **Hose for Conducting Steam.** Standard Oil Development Co.

543,308. **Polymerization Products.** Standard Oil Development Co.

543,352. **Manufacture of Rubber.** United States Rubber Co.

543,420. **Olefin Polymers.** Standard Oil Development Co.

543,579. **Processes for the Manufacture of Keto-Alcohols.** Instituto Per Lo Studio Della Gomma Sintetica and G. Natta.

UNCLASSIFIED

United States

2,274,906. **Refrigerator Railway Car.** J. S. Lundvall, assignor to Union Asbestos & Rubber Co., both of Chicago, Ill.

2,274,984. **Modernization of Wood Wagon Wheels to Receive an Inflatable Rubber Tire.** S. A. Huebner, Forest Junction, Wis.

2,275,897. **Reversible Tractor Wheel.** C. E. Gifford, Marion, O., assignor to Wingfoot Corp., Wilmington, Del.

2,277,036. **Anti-Skid Device.** F. P. Chaussee, Missoula, Mont.

2,277,554. **Overload Releasing Mechanism.** W. C. McCoy, Shaker Heights, assignor to General Tire & Rubber Co., Akron, both in Ohio.

2,277,724. **Apparatus for Reconditioning Rolls of Resilient Surface Characteristics.** C. F. Smith, Cicero, assignor to Rapid Roller Co., Chicago, both in Illinois.

2,277,864. **Means and Method of Coiling Hose.** A. G. Horvath, assignor to Dayton Pump & Mfg. Co., both of Dayton, O.

2,278,239. **Hose Coupling.** C. G. Butler, assignor to Cincinnati Ball Crank Co., both of Cincinnati, O.

2,278,416. **Golf Ball Tester.** R. Atti, Cliffside Park, N. J.

2,278,709. **Titanium Dioxide Pigments.** W. G. Moran, Woodbridge, N. J., assignor to National Lead Co., New York, N. Y.

2,279,140. **Electrical Tire Pressure Gage and Indicator.** L. J. Kellen, Ashton, Iowa.

2,279,799. **Noise Maker for Hollow Rubber Toys.** J. F. Stanford, Cuyahoga Falls, assignor to S. W. Anderson, doing business as Anderson Rubber Co., both in Akron, O.

2,280,380. **Tire Removing Tool.** F. E. Davenport, Geneva, Iowa.

2,280,637. **Wheel Balance.** H. T. Kraft, assignor to General Tire & Rubber Co., both of Akron, O.

2,281,016. **Hip Boot Drying Hanger.** M. D. Barney, Billings, Mont.

2,281,476. **Tire Compressor for Removing Tires from Rims.** T. G. Casey, Oakland, Calif.

(*Concluded on page 302*)

State and Territory Tire and Tube Quotas for May and June, 1942

United States and Territories United States	MAY: Passenger, Motorcycle, Tires and Tubes — New Tires State Quota	Recaps State Quota	New Tubes State Quota	MAY: Truck, Bus, Etc., Tires and Tubes — New Tires State Quota	Recaps State Quota	New Tubes State Quota	JUNE: Passenger, Motorcycle, Tires and Tubes — New Tires State Quota	Recaps State Quota	New Tubes State Quota	JUNE: Truck, Bus, Farm Tractor, Implement, Etc., Tires and Tubes — New Tires State Quota	Recaps State Quota	New Tubes State Quota
Alabama	768	8,534	4,625	4,745	7,565	6,557	654	8,455	4,566	4,966	7,316	6,196
Arizona	284	1,558	916	1,944	2,623	2,433	256	1,662	962	2,124	2,812	2,490
Arkansas	440	2,226	1,326	3,541	5,646	4,894	373	2,422	1,401	3,742	5,513	4,669
California	4,187	41,889	22,909	14,365	22,904	19,853	3,780	29,273	16,570	16,297	24,023	20,341
Colorado	681	4,140	2,397	3,401	4,571	4,245	623	4,216	2,426	3,118	4,593	3,890
Connecticut	789	20,994	10,830	3,420	5,454	4,727	712	17,939	9,350	3,457	5,097	4,315
Delaware	123	1,168	642	569	908	787	112	1,080	598	575	845	717
District of Columbia	380	2,452	1,408	1,078	1,719	1,490	355	1,745	1,053	1,079	1,590	1,346
Florida	1,150	6,284	3,696	5,838	9,307	8,068	974	4,941	2,965	6,027	8,883	7,522
Georgia	1,130	6,491	3,789	6,431	10,254	8,888	960	5,327	3,152	6,732	9,913	8,397
Idaho	216	1,064	637	1,291	2,058	1,784	195	959	578	1,500	2,216	1,875
Illinois	3,413	38,678	20,928	11,055	17,627	15,278	3,089	31,664	17,422	11,188	16,463	13,950
Indiana	1,650	24,725	13,114	6,865	10,388	9,190	1,495	20,784	11,169	6,832	9,627	8,303
Iowa	1,321	8,394	4,830	4,793	7,642	6,624	1,195	6,599	3,907	4,900	7,217	6,113
Kansas	992	6,224	3,588	4,058	7,427	6,438	899	5,123	3,019	4,968	7,316	6,197
Kentucky	758	5,412	3,068	3,845	6,131	5,314	687	4,250	2,475	3,850	5,672	4,804
Louisiana	707	4,492	2,585	5,056	8,062	6,988	599	4,021	2,316	5,308	7,823	6,624
Maine	278	2,766	1,514	1,826	2,911	2,524	252	2,374	1,316	1,878	2,764	2,342
Maryland	738	9,848	5,263	3,126	4,985	4,320	654	9,089	4,884	3,148	4,638	3,928
Massachusetts	1,653	21,753	11,637	6,631	10,573	9,164	1,481	19,114	10,324	6,689	9,867	8,352
Michigan	2,680	51,013	26,696	7,343	11,708	10,148	2,421	39,831	21,181	7,452	10,980	9,299
Minnesota	1,097	7,021	4,036	3,923	6,654	5,635	989	5,840	3,424	4,004	6,280	5,188
Mississippi	484	2,639	1,553	3,502	5,584	4,840	412	2,106	1,262	3,708	5,460	4,625
Missouri	1,609	11,881	6,707	7,613	12,138	10,521	1,451	10,372	5,927	7,701	11,345	9,609
Montana	217	1,334	771	1,701	2,712	2,350	196	1,448	824	1,884	2,775	2,351
Nebraska	651	3,431	2,030	2,825	4,504	3,904	589	2,693	1,645	2,878	4,240	3,591
Nevada	93	516	303	837	1,016	987	84	583	334	925	1,067	1,005
New Hampshire	195	1,756	970	831	1,723	1,360	188	1,781	987	858	1,620	1,250
New Jersey	1,635	29,840	15,649	6,858	10,935	9,478	1,479	25,749	13,650	6,888	10,152	8,597
New Mexico	247	1,210	725	1,845	2,942	2,550	223	1,118	672	2,135	3,144	2,663
New York City	1,620	10,234	5,894	6,171	9,838	8,528	1,464	7,984	4,736	6,227	9,172	7,769
New York other than New York City	3,037	34,006	18,418	11,567	18,442	15,985	2,743	26,937	14,879	11,674	17,192	14,563
North Carolina	1,343	7,527	4,410	6,103	9,731	8,434	1,139	5,504	3,330	6,366	9,381	7,944
North Dakota	236	1,152	690	1,291	2,058	1,784	214	828	522	1,321	1,937	1,644
Ohio	3,284	48,448	25,721	10,824	17,258	14,959	2,968	41,080	22,081	10,824	15,946	13,505
Oklahoma	1,072	5,784	3,409	5,606	8,938	7,748	912	4,609	2,768	6,087	8,965	7,593
Oregon	649	4,579	2,599	3,141	5,008	4,340	590	4,264	2,433	3,590	5,242	4,456
Pennsylvania	3,850	57,701	30,603	14,280	22,769	19,736	3,484	47,990	25,804	14,304	21,059	17,840
Rhode Island	310	4,197	2,241	1,112	1,773	1,537	280	2,690	1,990	1,129	1,663	1,409
South Carolina	686	4,182	2,420	2,926	4,665	4,044	582	3,233	1,912	3,063	4,512	3,822
South Dakota	274	1,351	808	1,356	2,161	1,874	249	1,021	637	1,374	2,018	1,711
Tennessee	958	7,759	4,334	4,687	7,473	6,478	818	6,458	3,647	5,144	7,260	6,258
Texas	3,418	19,335	11,312	17,935	28,596	24,786	2,903	15,339	9,145	19,416	28,603	24,225
Utah	279	1,868	1,068	1,327	2,115	1,834	251	1,920	1,088	1,538	2,268	1,920
Vermont	135	1,356	741	840	1,338	1,160	122	1,114	620	847	1,247	1,056
Virginia	966	10,846	5,873	4,758	8,065	6,831	883	11,150	6,032	4,794	7,487	6,196
Washington	781	7,741	4,237	3,599	5,738	4,974	700	7,127	3,924	4,101	6,059	5,125
West Virginia	572	5,637	3,087	3,242	5,169	4,480	518	4,388	2,459	3,250	4,787	4,055
Wisconsin	1,030	13,604	7,276	4,372	7,369	6,254	932	10,853	5,908	4,442	6,911	5,728
Wyoming	118	574	344	758	1,208	1,047	106	625	367	883	1,300	1,101
Territories												
Alaska	41	...	20	169	...	90	14	55	35	74	109	92
Puerto Rico	321	345	331	306	489	423	310	234	273	316	465	394
Virgin Islands	5	27	16	39	38	41	5	17	11	39	35	37
Panama Canal Zone	22	106	64	94	150	130	20	73	47	101	145	124
Total	55,573	578,092	315,058	238,259	379,060	328,836	49,584	479,051	265,007	247,715	365,014	309,116

COTTON & FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Mar. 28	Apr. 25	May 2	May 9	May 16	May 23
May ..	19.40	19.23	19.18	19.35	....	....
June ..	....	19.34	19.30	19.47	19.35	19.06
July ..	19.54	19.44	19.42	19.60	19.48	19.19
Sept. .	19.61	19.54	19.55	19.80	19.66	19.33
Dec. ..	19.65	19.69	19.77	20.01	19.85	19.56
Mar. ..	19.75	19.82	19.89	20.15	20.01	19.73
Apr. ..	....	....	....	....	20.05	19.78

New York Quotations

May 22, 1942

Drills

38-inch 2.00 yard	yd.	....
40-inch 3.47-yard		....
50-inch 1.52-yard		$0.31 5/8
52-inch 1.85-yard		.25 7/8
52-inch 1.90-yard		.25 1/4
52-inch 2.20-yard		....
52-inch 2.50-yard		....
59-inch 1.85-yard		....

Ducks

38-inch 2.00-yard D. F.		.21 3/4
40-inch 1.45-yard S. F.		.29 3/4
51 1/2-inch 1.35-yard D. F.		....
72-inch 1.05-yard D. F.		.50
72-inch 17-21 ounce		.57

Mechanicals

Hose and belting	lb.	.47 3/4

Tennis

51 1/2-inch 1.35-yard	yd.	.33 3/4
51 1/2-inch 1.60-yard	yd.	.28 3/4
51 1/2-inch 1.90-yard	yd.	.24 1/2

Hollands—White

Blue Seal

20-inch	yd.	.13 1/2
30-inch		.24 1/4
40-inch		.27

Gold Seal

20-inch No. 72	yd.	.14 1/2
30-inch No. 72		.25 3/8
40-inch No. 72		.29

Red Seal

20-inch	yd.	.12 1/4
30-inch		.22
40-inch		.24 1/2

Osnaburgs

40-inch 2.34-yard	yd.	.15 3/4
40-inch 2.48-yard		.14 7/8
40-inch 2.56-yard		....
40-inch 3.00-yard		.12 1/2
40-inch 7-ounce part waste		.15
40-inch 10-ounce part waste		.21 1/8
37-inch 2.42-yard clean		.15 1/4

Raincoat Fabrics

Cotton

Bombazine 64 x 60	yd.	....
Plaids 60 x 48		....
Surface prints 64 x 60		....
Print cloth, 38 1/2-inch, 64 x 60		.08971

Sheetings, 40-inch

48 x 48, 2.50-yard	yd.	.16200
64 x 68, 3.15-yard		.13968
56 x 60, 3.60-yard		.11944
44 x 40, 4.25-yard		.09764

Sheetings, 36-inch

48 x 48, 5.00-yard	yd.	.08600
44 x 40, 6.15-yard		.06991

Tire Fabrics

Builder

17 1/4 ounce 60" 23/11 ply Karded peeler	lb.	.49

Chafer

14 ounce 60" 20/8 ply Karded peeler	lb.	.48
9 1/4 ounce 60" 10/2 ply Karded peeler	lb.	.48

Cord Fabrics

23/5/3 Karded peeler, 1 3/8" cotton	lb.	.49
15/3/3 Karded peeler, 1 1/8" cotton	lb.	.47
12/4/2 Karded peeler, 1 1/8" cotton	lb.	.48
23/5/3 Karded peeler, 1 1/4" cotton	lb.	.49

Leno Breaker

8 1/4 ounce and 10 1/4 ounce 60" Karded peeler	lb.	.49

THE May cotton market moved within narrow price fluctuations, reflecting uncertainty in the trade concerning various governmental proposals and actions. Turnover was small, with occasional spurts in activity and prices. The 15/16-inch spot middling grade which closed at 20.90¢ per pound April 30 was quoted at 21.15¢ per pound May 8 and at 20.88¢ per pound May 18. Closing quotations on May 31 were 20.55¢ per pound.

The United States Bureau of the Census reported an average daily consumption of 45,900 bales in April. Total consumption for the month was 998,754 running bales, compared with the previous high of 966,631 bales in March and 920,950 bales in April, 1941. Consumption for the nine months ending April 30 was 8,254,493 bales, against 6,992,591 bales in the same period last season. Stocks held by mills on April 30 were 2,631,899 bales, against the record high of 2,651,614 bales at the end of March. Stocks in public storage and at compresses were 10,396,962 bales, contrasted with 11,352,967 bales March 31 and 12,369,867 on April 30, 1941.

WPB orders for mill conversion to duck and osnaburg output are expected to increase the rate of cotton consumption. A shortage of labor and unfavorable weather conditions have reduced planting in Atlantic Seaboard and Gulf states below the acreage allotments for those areas. Unless this reduction is offset by increased planting in Texas, Oklahoma, and Arizona, the total area planted may not exceed 23,700,000 acres; whereas 27,000,000 acres were alloted growers.

Fabrics

May demands for cotton gray goods were steady, and though somewhat smaller than in April, supplies were inadequate in comparison with the demand for fabrics for early delivery. Military orders held to high levels, and a considerable amount of cloth was obtained for civilian purposes. With the use of rubber in raincoats restricted, many rubberizing factories are working on various types of synthetic resin coatings. It is reported that some adequate substitutes have been developed; while others are still in the experimental stage.

WPB General Preference Order No. M-134, issued and effective April 27, assigned a preference rating of A-2 to purchase orders for cotton textile fabrics from which insulation tape for electrical cables is made. The order specified certain constructions of osnaburgs, sheetings, and print cloths, and restricted inventories of tape manufacturers to a 60-day supply of fabrics suitable for tape.

Supplementing the General Maximum Price Regulation, OPA issued amendments April 29, to six cotton products' price schedules pegging the previous sliding-scale ceilings on the basis of a spot cotton price of 20.37¢ per pound, resulting in a price of 48¢ per pound for Class A print cloth. The cotton price was the highest average for cotton sold at the ten leading southern markets during March. The price schedules covered by the April 29 amendments, which became effective May 4, included No. 35—Carded Gray and Colored-Yarn Cotton Goods, and No. 118—Cotton Products.

Amendment No. 3 to Maximum Price Regulation No. 118, issued May 21 and effective May 25, placed specific ceilings on cotton duck and seven other leading cotton fabric groups. The duck ceilings cover 11 major kinds of the fabric.

Adjustments to the new ceiling levels caused small fractional price changes in most types and grades of cloth herewith quoted. Tire fabrics are up 1¢ per pound.

UNCLASSIFIED

(Concluded from page 300)

2,282,221. **Aircraft Structural Girder.** H. B. Gibbons, Stratford, Conn., assignor, by mesne assignments, to Wingfoot Corp., Akron, O.

Dominion of Canada

403,163. **Auxiliary Anti-Skid Wheel** Carried by a Rubber-Tired Vehicle Wheel. W. S. Rollings, West Newton, Pa., U. S. A.

403,228. **Knitting Machine** with Elastic Yarn Feeding Finger. Hemphill Co., Central Falls, assignee of A. L. Hutton, Jr., Lonsdale, and E. St. Pierre, Pawtucket, co-inventors, all in R. I., U. S. A.

403,682. **Heat Insulating Tape.** Union Asbestos & Rubber Co., Chicago, assignee of W. F. Astley, Cicero, both in Ill., U. S. A.

403,797. **Insecticide Preparation** Containing as a Stabilizer therefor p-(p-Toluene Sulphonyl-amino) Diphenylamine. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. P. ter Horst, Packanack Lake, N. J., U. S. A.

403,798. **Fungicidal Preparation** Containing As an Active Constituent an N,N'-Tetra-Alkyl-Diamino-Diaryl Methane. Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of W. P. ter Horst, Packanack Lake, N. J., U. S. A.

404,139. **Separable Slide Fastener.** United States Rubber Co., New York, N. Y., U. S. A., assignee of Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. M. Gay, Cheshire, Conn., U. S. A.

404,257. **Spark Plugs.** Firestone Tire & Rubber Co., assignee of J. H. Dillon, both of Akron, O., U. S. A.

404,386. **Flexible Core for Window Glass Channelling.** General Tire & Rubber Co., Akron, O., assignee of R. J. Bush, Wabash, Ind., both in the U. S. A.

TRADE MARKS

United States

393,447. **Vari-Line.** Rubber stamps, type, type holders, and office printing outfits. Superior Type Co., Chicago, Ill.

393,476. **Pro-tek-tubes.** Prophylactics. Edward J. Moore Sons, Inc., doing business as Sanger & Co., Long Island City, N. Y.

393,517. **Resisto-Hyde.** Artificial leather upholstery material. Seaman Paper Co., Chicago, Ill.

393,525. **Challenger.** Bicycles. B. F. Goodrich Co., New York, N. Y.

393,533. Representation of a seal containing a laurel wreath, and the letters: "B F G 1870." Cement and putty. B. F. Goodrich Co., New York, N. Y.

393,636. Representation of a triangle containing the word: "**Wide-R-Aize.**" Corsets, etc., Dominion Corset Co., Ltd., Quebec, P. Q., Canada.

393,643. **Kayser.** Clothing, including girdles. Julius Kayser & Co., New York, N. Y.

393,645. **Wellco.** Footwear. Wellco Shoe Corp., Waynesville, N. C.

393,666. **Tarzac.** Synthetic rubber plasticizer. R. T. Vanderbilt Co., Inc., New York, N. Y.

393,669. **Curv-Flex.** Rubber gloves. B. F. Goodrich Co., New York, N. Y.

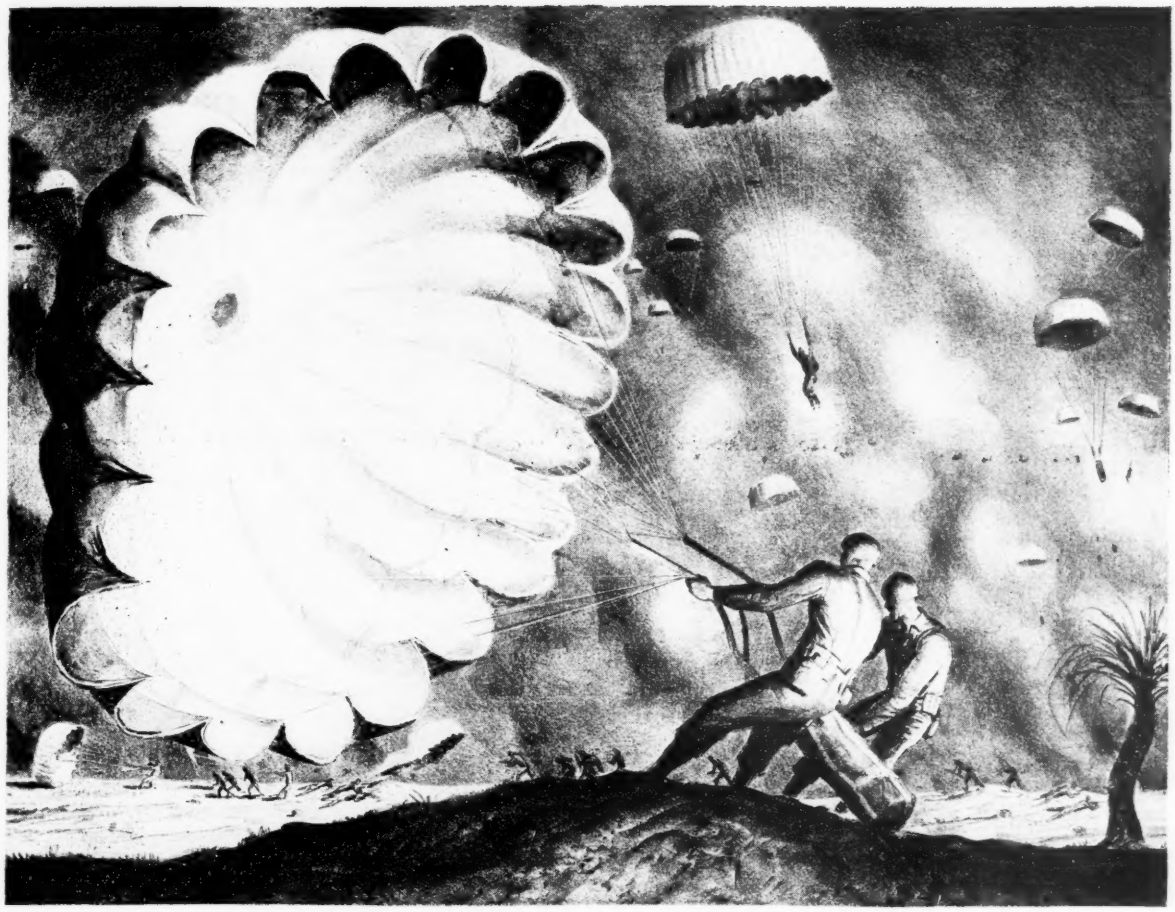
393,704. **Shirt Grippers.** Garment grippers. I. B. Kleinert Rubber Co., New York, N. Y.

393,708. **"Twin-Bak."** Foundation garments, etc. Venus Foundation Garments, Inc., Chicago, Ill.

393,834. **Firestone.** Gas and electric ranges. Firestone Tire & Rubber Co., Akron, O.

393,843. **Glanskaps.** Prophylactics. A. Sawyer and E. B. Miller, doing business as Nixon-Stuart & Barker, Peoria, Ill.

393,940. **Happy Go Round.** Shoes. Buck Shoe Corp., Philadelphia, Pa.



THE LOGISTICS OF THE SKY . . . one of the newer sides of warfare . . . has been developed to the point where equipment ranging all the way from radio transmitters to baby tanks comes raining down with the parachute troops who will be using it.

Naturally, equipment-carrying "chutes" are required in great numbers — and to furnish these is one more way that cotton serves our war effort. Cotton also plays its part in equipping and protecting men and machines in all branches of the service.

Because practically our entire duck production is now assigned to Army and Navy requirements—normal supplies of our Hose and Belting Duck are not now available for consumer use

Rims Approved and Branded by The Tire & Rim Association, Inc.

Rim Size	3 Months 1942
15" and 16" D. C. Passenger	
16x4.00E	364,090
16x4.25E	4,049
16x4.50E	120,819
15x5.00E	17,664
16x5.00E	21,760
15x5.00F	1,395
16x5.00F	16,802
15x5.50F	47,065
16x5.50F	5,851
16x6.00F	6,537
16x4.00E "Hump"	35,767
16x4.25E "Hump"	12,857
16x4.50E "Hump"	1,073
15x5.00F "Hump"	2,795
16x6-L	46,172
15x6½-L	7,533
17" and over D. C.	
All Sizes	34,952
Clincher	
All Sizes	463
Military	
16x4.50CÉ	112,230
20x6.00CT	3,383
16x6.50CS	4,273
Flat Base Truck	
15x3.75P (5")	53
17x3.75P (5")	4,314
18x3.75P (5")	4,192
20x3.75P (5")	104,074
18x4.33R (6")	341
20x4.33R (6")	356,748
24x4.33R (6")	1,035
15x5.00S (7")	17,984
18x5.00S (7")	7,800
20x5.00S (7")	1,065,426
22x5.00S (7")	1,056
24x5.00S (7")	1,694
15x6.00T (8")	10,406
18x6.00T (8")	9,087
20x6.00T (8")	95,320
22x6.00T (8")	24,835
24x6.00T (8")	340
15x7.33V (9/10")	25
18x7.33V (9/10")	202
20x7.33V (9/10")	43,300
22x7.33V (9/10")	3,144
24x7.33V (9/10")	5,952
19x8.37V (11")	430
20.8.37V (11")	6,190
24x8.37V (11")	5,259
24x10.00W	426
Semi D. C. Truck	
16x4.50E	16,256
15x5.50F	2,091
16x5.50F	65,818
Agricultural	
12x2.50C	208
18x2.50C	760
12x3.00D	3,994
15x3.00D	41,544
16x3.00D	740
18x3.00D	1,431
19x3.00D	15,924
21x3.00D	3,710
36x3.00D	1,110
40x3.00D	93
21x3.25E	160
20x4.50E	2,209
22x4.50E	416
18x5.50F	10,510
20x5.50F	6,639
24x5.50R	609
36x5.50R	64
24x6.00S	371
36x6.00S	1,605
24x8.00T	5,567
28x8.00T	684
32x8.00T	469
36x8.00T	391
40x8.00T	31
42x8.00T	79
W7-24	5,592
W7-36	1,974
W7-38	988
W8-24	14,027
W8-28	33
W8-32	2,022
W8-36	510
W8-38	1,260
W8-40	611
W9-24	1,467
W9-28	325
W9-36	119
W9-38	572
W10-28	4,203
W10-36	416
W10-40	1,960
W11-26	202
DW9-38	5,376
DW10-26	338
DW10-38	2,931
DW11-24	587
DW11-26	814
DW11-28	812
DW11-32	50
DW11-38	1,245
DW12-30	1,407
DW12-34	991
Cast	
24x11.25	2
24x13.00	98
24x15.00	297
TOTAL	2,871,875

Rubber and Canvas Footwear Statistics

	Thousands of Pairs		
	Inventory	Production	Shipments
1938	16,183	50,812	54,942
1939	16,388	60,612	60,377
1940	11,129	57,278	62,480
1941	9,170	72,217	74,080
1942			
Jan.	8,315	5,545	6,300
Feb.	7,907	4,753	5,213
Mar.	6,803	4,479	5,247

Source: *Survey of Current Business*, Bureau of Foreign & Domestic Commerce, Washington, D. C.

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	March, 1942		Three Months Ended March, 1942	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Crude rubber, etc. ..... lb.	.....	.....	.....	.....
Latex (dry weight) ..... lb.	.....	.....	.....	.....
Gutta percha ..... lb.	1,587	$ 617	11,675	$ 9,598
Rubber, recovered ..... lb.	2,356,600	136,701	7,410,100	501,908
Rubber, powdered, and gutta percha scrap ..... lb.	671,000	30,818	2,419,200	98,129
Balata ..... lb.	10,619	4,951	13,752	6,564
Rubber substitute ..... lb.	240,000	45,227	565,600	127,798
Totals	3,279,806	$218,314	10,420,327	$ 743,997
PARTLY MANUFACTURED				
Hard rubber comb blanks	.....	.....	.....	$ 375
Hard rubber, n. o. s. ..... lb.	2,882	2,268	5,068	5,042
Rubber thread not covered .. lb.	.....	.....	1,043	1,021
Totals	2,882	$ 2,268	6,111	$ 6,438
MANUFACTURED				
Bathing shoes ..... prs.	.....	.....	2,905	$ 1,103
Belting	.....	$ 17,275	.....	57,647
Hose	.....	20,311	.....	74,618
Packing	.....	7,033	.....	34,444
Boots and shoes ..... prs.	120	103	1,525	1,488
Canvas shoes with rubber soles ..... prs.	120	60	120	60
Clothing, including waterproofed	.....	1,340	.....	6,283
Raincoats ..... no.	8,531	44,793	18,039	98,097
Gloves ..... doz. prs.	116	574	943	2,617
Hot water bottles	.....	806	.....	1,034
Liquid sealing compound	.....	4,701	.....	4,701
Tires, bicycle ..... no.	64	79	894	734
Pneumatic ..... no.	95	1,654	325	4,554
Solid for automobiles and motor trucks ..... no.	12	680	113	7,047
Other solid tires ..... no.	.....	422	.....	3,619
Inner tubes ..... no.	5	23	26	127
Bicycle ..... no.	84	45	876	277
Mats and matting	.....	12,164	.....	38,071
Cement	.....	9,560	.....	53,324
Golf balls ..... doz. prs.	4	17	5,028	10,584
Heels ..... prs.	7,558	966	28,032	2,977
Other rubber manufactures	.....	173,462	.....	569,414
Totals	.....	$296,068	.....	$ 972,820
Totals, rubber imports	.....	$516,650	.....	$1,723,255

Exports of Domestic and Foreign Rubber Goods

	Produce of Canada Value	Reexports of Foreign Goods Value	Produce of Canada Value	Reexports of Foreign Goods Value
UNMANUFACTURED				
Crude rubber	.....	.....	.....	.....
Waste rubber	$ 12,599	.....	$ 43,655	.....
MANUFACTURED				
Belting	$ 13,626	.....	$ 34,277	.....
Bathing caps	.....	.....	136	.....
Canvas shoes with rubber soles .	11,757	.....	31,818	.....
Boots and shoes	258,966	.....	547,646	.....
Clothing, including waterproofed	16,070	.....	52,801	.....
Heels	68	.....	2,518	.....
Hose	4,341	.....	29,537	.....
Soles	.....	.....	1,271	.....
Soling slabs	.....	.....	.....	.....
Tires, pneumatic	1,338,425	.....	3,550,343	.....
Not otherwise provided for ..	67,621	.....	186,871	.....
Inner tubes	111,405	.....	283,215	.....
Other rubber manufactures	36,271	.....	49,159	.....
Totals	$1,858,550	.....	$4,769,592	.....
Totals, rubber exports	$1,871,149	.....	$4,813,247	.....

Rubber Bibliography

(*Continued from page 290*)

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MECHANICAL GOODS SUPERINTENDENT OR General Foreman—Must be familiar with all operations and able to handle labor satisfactorily. Excellent opportunity with old-established rubber company. State age, education, and complete experience first letter to Box No. 422, care of INDIA RUBBER WORLD.

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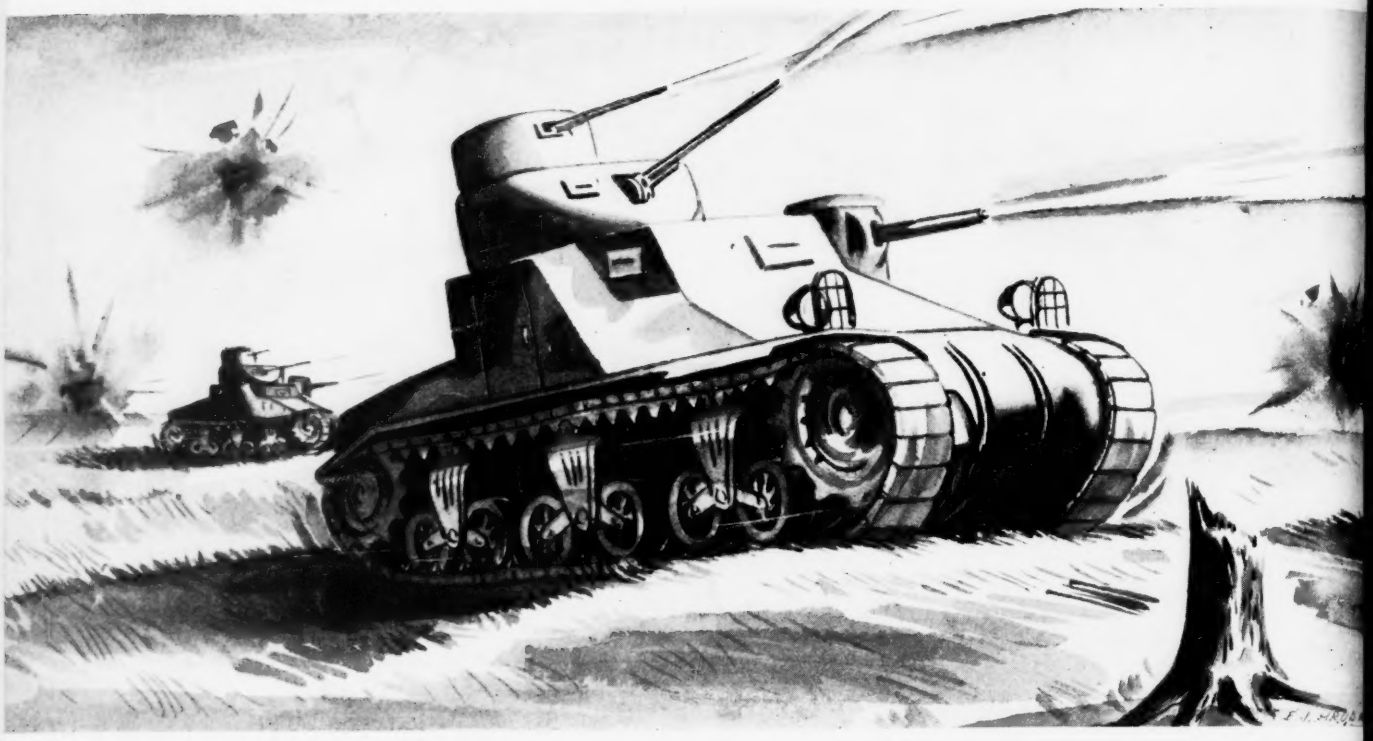

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